VOL. XI. No.4 APRIL 1926

MECCANO MAGAZINE



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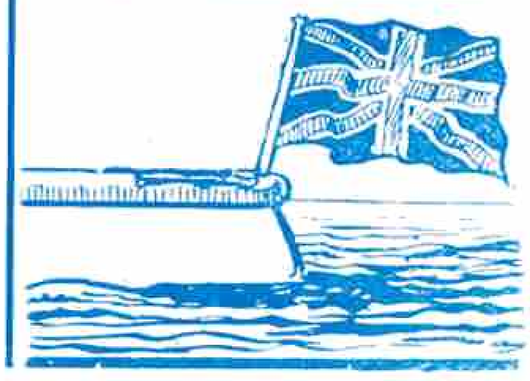
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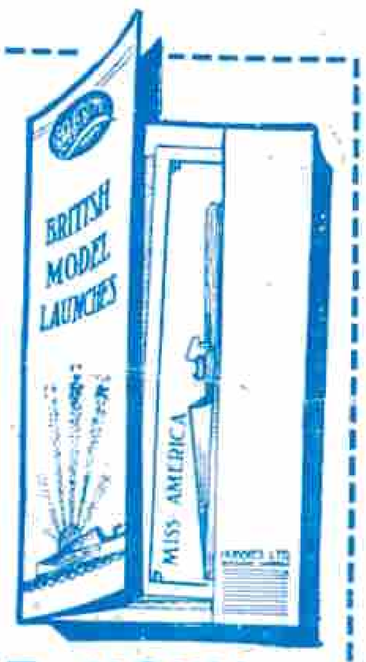


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MECCANO MAGAZINE

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With the Editor

The Race between Big Guns and Armour Plate

There has always been great rivalry, and an unending race, between certain nations in methods of attack and defence, and great efforts have been put forward at times to gain the upper hand in the conflict between the rival camps. Take, for instance, torpedoes, originally invented to move under water and so to hit a warship below its belt of armour. Torpedoes had not long been in existence before they were countered by the torpedo-net, hung out on booms from the side of the ship. These nets kept torpedoes at arm's-length and prevented them detonating against the side of the ship. For a time, therefore, the destructive properties of the torpedo were countered, but not for long. Inventors soon brought out a new contrivance fitted in the nose of the torpedo, which cut through the meshes of the protective torpedo-net, allowing the torpedo once again to reach its destination. Thus it became very necessary that warships should be well protected, both above and below the water line, by heavy armour plate.

There has always been keen competition, too, between the makers of armour-plate and the makers of guns. As soon as a gun was evolved that could pierce existing armour, the steel manufacturers set to work to produce an armour that would resist the new projectile. This led to larger and larger guns being forged, and, in turn, to thicker or more effective armour-plate, and consequently larger ships had to be built to carry all this increased weight.

It was felt very desirable that someone should call a halt in this costly business of building huge ships and mounting increasingly heavy guns and after a great deal of spade work by diplomats a Naval Conference was called at Washington. Here the five great powers, Britain, America, Japan, France, and Italy—whose interest in naval matters is greater than that of any other nations—agreed on a limitation of armaments. They could not agree to limit the number of cruisers to be constructed, but they did agree that the size of all cruisers should be limited to 10,000 tons, and that no cruiser should mount guns of a calibre greater than 8 in.

Curious Result of Trying to do Good

After this agreement had been arrived at everyone concerned began to build 10,000-ton cruisers with 8 in. guns. Britain is now building 16 of these new cruisers and, incidentally, 48 cruisers, fitted with 6 in. guns are to be scrapped as "out-of-date." In order to be in line with other nations, these new cruisers must be able to steam at least 32 knots. To attain this high speed necessitates them being fitted with huge engines that, together with the 8 in. guns, account for a considerable proportion of the total weight allowed. In fact, engine and guns absorb so much of the 10,000-ton limit that there is scarcely any margin left for the usual protective armour-plating. A naval expert has said that at the most these new cruisers will have a patch of 3 in. armour-plate on the water-line. He declares that it might as well be cardboard for all the protection it offers against the 250 lb. shells fired by 8 in. guns.

Although the new cruisers will move more quickly, fire heavier projectiles and shoot further than their predecessors, it is unlikely that any one of them could remain afloat for any length of time after it had been hit. Although each of these cruisers costs over two-and-a-half millions to build and £240,000 a year to keep up, it is of more importance that they each carry 550 officers and men, and to say the least of it, it is a queer result of the Washington Conference that instead of doing good, the deliberations have resulted in planning new cruisers that are veritable death-traps for their crews, who are doomed to certain destruction the moment their ship is hit by a torpedo.

"Do it Now"

The other day I was reminded by a few verses (see page 266) that when I was a small boy my father used to often tell me that "Procrastination is the thief of time." In those early days I used to wonder why this peculiarly-named individual should always be stealing clocks and watches! (Perhaps I associated him in my mind with another person, "Bill Stickers," whom I always regarded as a very much disliked individual, for on almost every hoarding I noticed the announcement that "Bill Stickers will be prosecuted!") However, later on I learned that my father's saying about procrastination could very well be translated into "Never put off until to-morrow what you can do to-day," and that this is a very good maxim to keep in mind is well illustrated by an incident in the story of the invention of the telephone, the centenary of which was celebrated a few days ago.

When one considers how long the world had been waiting for the invention of a telephone, it is a remarkable fact that within an hour of Graham Bell filing his specification for his patent, another inventor, Elisha Gray, also applied for a patent for a telephone on somewhat similar lines to Bell's. The coincidence did not end there, however, and it is even more remarkable that both patents were applied for at the same office! Neither of the inventors had the slightest idea that the other was engaged on similar research work. Had Bell put off, as he easily might have done, the filing of his patent for even a few hours, he would have lost a fortune, for the Bell telephone has been described as being the most valuable patent ever issued.

Whilst congratulating Bell, we cannot but sympathise with Gray, whose disappointment must have been very acute. There were subsequently hundreds of actions in the Courts over this patent, but Bell triumphed every time. Had he delayed the applying for a patent until the next day, there is no doubt that Gray would have reaped the reward that was Bell's. Although it may never fall to the lot of any of my readers to miss a fortune by such a narrow margin, they may be earnestly recommended, nevertheless, to act at once in everything they do, and not to put off their work until to-morrow, for as another proverb says:—"To-morrow never comes."

The Lazy Boys of To-day

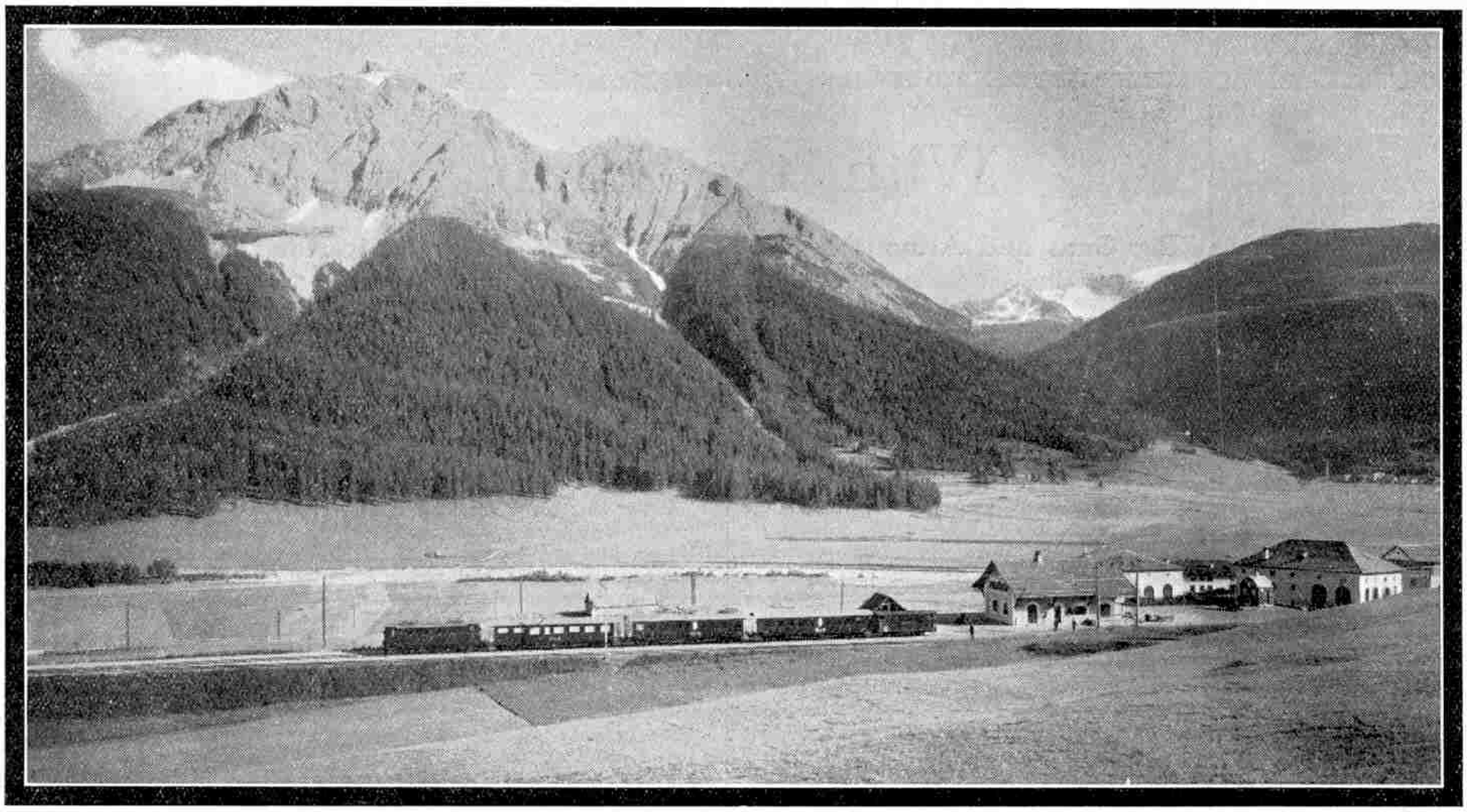
I see that a firm of engineers at Ilford (Essex) has been complaining that it cannot get enough boys to fill the vacant positions in their works. It seems that there are plenty of boys of a kind, but this firm's experience is that the boy of to-day is "lazy, ignorant, dirty and stupid."

"Many lads who have been sent to us," the firm states, "slouch up with both hands in their trousers pockets and lounge wearily against the door-post. They conduct an interview with the foreman with the inevitable 'fag-end' in the corner of the mouth. Some are exceedingly dirty, others appear to be mentally deficient. Quite a good percentage obviously do not want work, and when not engaged, go away feeling quite relieved. One lad questioned as to the number of sixteenths in an inch, replied that he did not know, but on further consideration he thought there were fourteen!"

I am sure that no Meccano boys have yet applied for a job with this particular firm whose indictment, I am certain, cannot be applied to any reader of the *"M.M."* Their remarks show, however, that there is always an opening for a bright intelligent boy. In these days of trade depression and unemployment, when everyone should be trying his hardest to "get on" either at school or at work, it is a matter for regret that it should be possible for any firm to find boys who are not eager to work and who do not want to "make good."

The Rhaetian Railway

An Electric Mountain Railway with 81 Tunnels and 407 Bridges



A Typical View on the Rhaetian Railway. The station at Madulein

OUR cover this month depicts a scene on the Rhaetian Railway in Switzerland, and shows an electric train on one of the many fine bridges over which this railway runs. The line is laid through some of the most beautiful scenery in the world, and the construction of the track may be claimed as a triumph of engineering skill, so that the railway is extremely interesting from more than one point of view.

Owing to the mountainous character of the country, the railway crosses a great number of steep valleys and wild gorges. This necessitated the construction of innumerable bridges, which had often to be built in the most difficult engineering circumstances. Often, too, huge masses of rock had to be cut away to form steps or ledges in mountain sides, on which the track could be laid. Altogether the planning and actual work of construction called for great technical ability and considerable perseverance and determination.

A Railway with a World-wide Reputation

The Rhaetian Railway is well known to most travellers in Switzerland, and as large numbers of people visit this charming country every year from all parts of the world, the railway probably enjoys a world-wide reputation, and, is perhaps, known even further afield than many of its " big brothers."

Although Switzerland is one of the smallest countries in Europe and has a total number of inhabitants less than the population of London, the traffic on the Rhaetian Railway and on the Swiss railways in general is very considerable on account of the large numbers of visitors. The railway runs through what is perhaps the most interesting part of Switzerland, the south-east region known as the Canton of the Grisons. This is decidedly an alpine canton for even its lowest valleys, where chestnuts ripen and where the vine and maize thrive excellently, are protected by high mountains.

The little alpine republic enjoys a particular all-the-year-round popularity, chiefly owing to its famous natural attractions. In the heat of summer it offers the cool mountain air of the Alps, and during the winter when fogs are prevalent in our large cities it offers the visitor the clear warm sunshine of its valleys. It is no matter for wonder, therefore, that with these attractions, and with a delightfully pure atmosphere, the Grisons is a favourite resort for sportsmen and invalids alike.

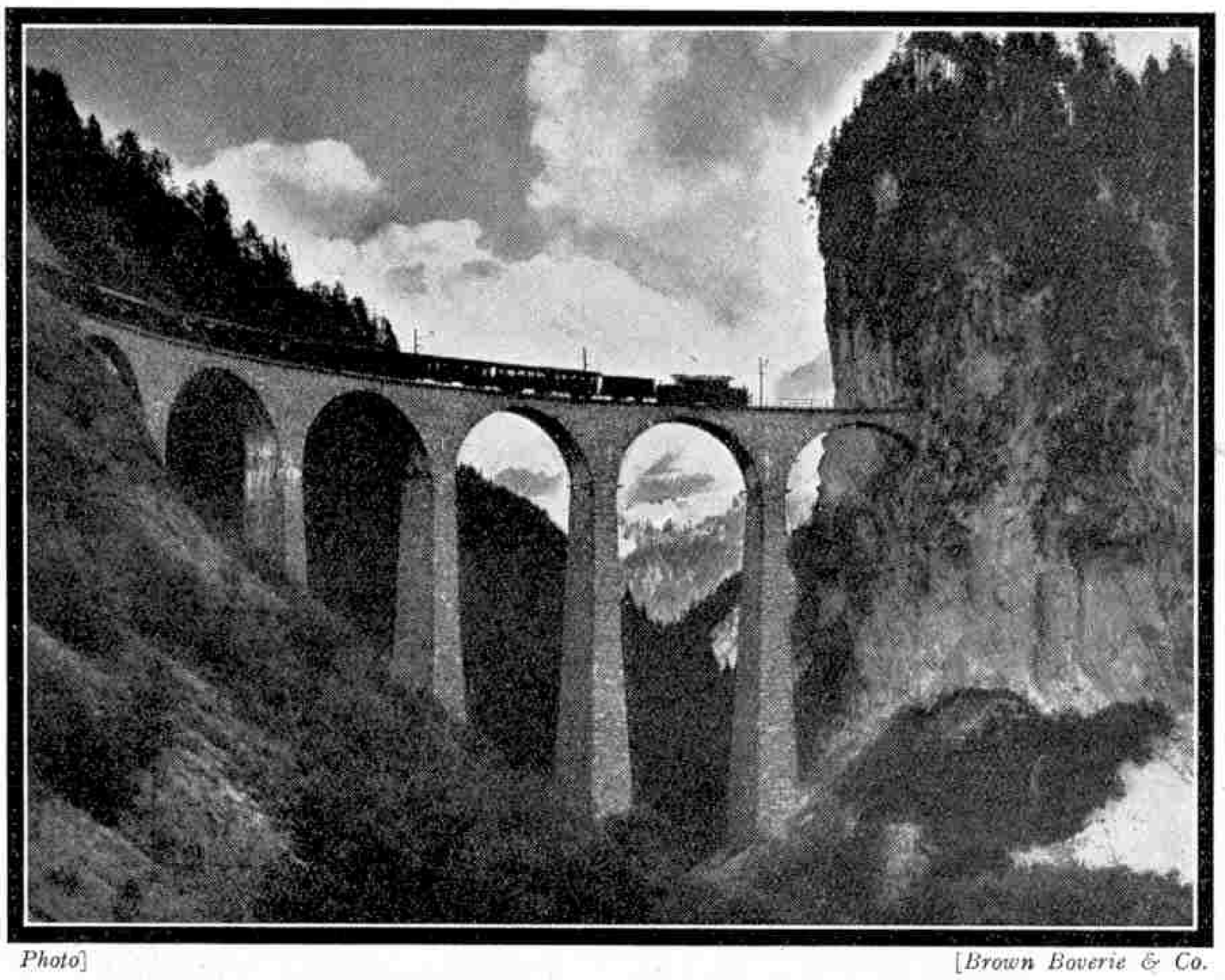
The Maze of Valleys

Nearly half the total area of the Grisons (2,775 square miles) consists of mountains, glaciers, and alpine lakes. There is also a complicated system of mountain rivers and torrents and, in fact, almost every natural feature that makes railway construction particularly difficult.

There is a regular maze of over 150 valleys, and a tourist on foot could easily become lost in the mountains without a guide. Consequently, travelling by road is

very difficult and even dangerous, especially during the winter when it is almost impossible for a guide to find his bearings when all the notable landmarks are covered with snow. The difficulty of winter travel was entirely overcome by the introduction of the mountain railways, however, which have linked up the valleys, and made the Alps more easily accessible to visitors at all seasons. To keep the line clear in winter is a strenuous task, as the snow is often piled on both sides of the line as high as the top of the carriage windows.

Conrad Mayer, a famous Swiss poet, has written (in "*Jurg Jenatsch*") of the bewildering multitude of these valleys. A minister who, when explaining the mountainous character of the country to the French Duke Rohan, gives the Duke, with a few bold strokes, a sketch of the geographical features. He reduces the confusion of the valleys to an ordered scheme by arranging them according to the rivers to which they belong, all of which rise in the country and flow into three different seas. He then speaks of the numerous mountain passes and dwells with evident interest and surprising knowledge of detail upon their military importance.



Photo] [*Brown Boverie & Co.*

The Landwasser Viaduct on the Albula Branch of the Rhaetian Railway, near Filisur

The Coming of the Romans

The canton of the Grisons has many historic associations, dating back to prehistoric times. In those days, it was inhabited by the Rhaetians, an uncultivated and warlike people of Celtic origin, who lived in the almost inaccessible mountains. Later, it was one of the regions that the Romans decided to possess, more particularly because of the important alpine passes that formed the shortest routes from the Lake of Como to Lake Constance.

Thus it came about that the country was conquered during the reign of Augustus and in the year 15 B.C. became a Roman province. Here the Romans, famous for their engineering accomplishments, built roads across the Alps, and established fortified camps, some of which are to-day traceable in ruins.

It is interesting to find that among the inhabitants of the Grisons many Roman customs still survive, and that even to-day the native language used in this canton was originally based on the Latin speech of the Roman soldiers and colonists, who settled in these districts.

Unfortunately we have not space to dwell at greater length on the interesting historical aspect of the country through which the Rhaetian railway runs. Indeed, the matter has only been mentioned to show that centuries ago the inhabitants of this canton were associated with a certain amount of engineering achievement.



Map of Rhaetian Railway

Importance of Road and Railways

The growth and maintenance of any country naturally depends upon the system and efficiency of its communications. The first thing the Romans did on landing in Britain was to construct a system of roads, for they knew the importance, especially in a hostile country, of having good communications.

The same is true, even to a greater extent in the case of the Swiss Cantons, which until the railways were constructed, depended for their communication entirely on the alpine passes. Until the commencement of last century there were no good roads in the Grisons and traffic had to cross the Alps by means of mere tracks. During the last century, however, a system of roads approximately 750 miles in total length was constructed, and some of the roads became as well known as the more famous alpine passes.

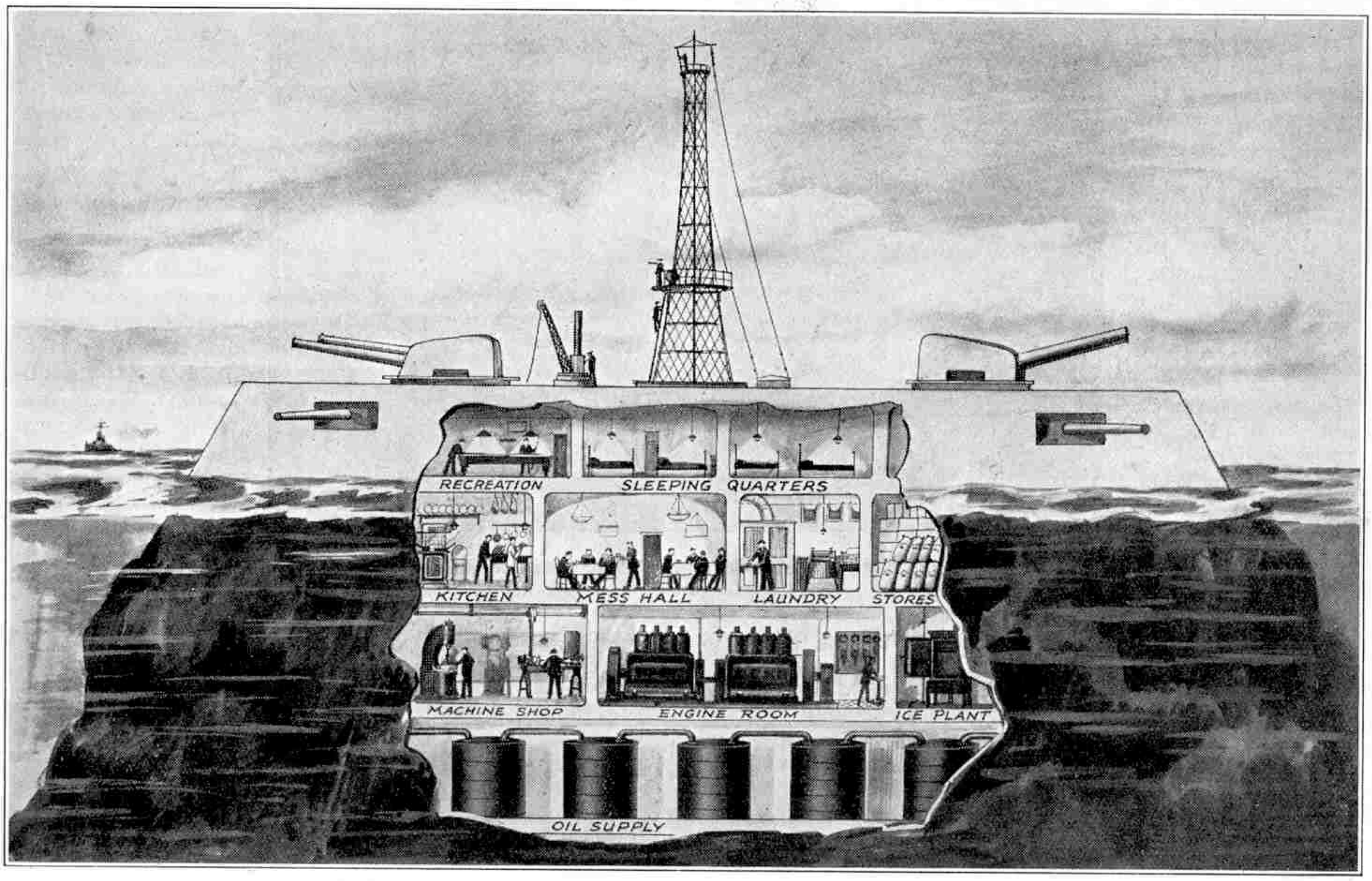
But even good roads are not the best means of maintaining communication and this is well illustrated by the fact that 25 years ago the south-east corner of Switzerland was comparatively unknown to the average tourist owing to its inaccessibility. The nearest railway station was at Coire, from which the traveller had to travel by diligence over by the Albula Pass—a journey requiring about 13 hours, and a very tiresome and uncomfortable journey it was! Now, as a result of the construction of the railway, the journey is accomplished in comfort in about 3½ hours.

It is interesting to note that up to 1923 the only motor traffic in the Grisons consisted of official postal cars. Laws in this canton are made by popular vote and in June 1923, by 11.420 votes against 9,066, it was decided to admit private cars on certain routes.

(*To be continued*)

Towers of Mystery:

Secrets of the War Revealed in "Stone Battleships"



Sectional View of Concrete Fort Guarding the Entrance to Manila Bay

In a recent issue we asked our readers if they could tell us anything about the Mystery Towers that were to be erected on various parts of the south coast during the War. We have had a large number of replies and all manner of reasons have been put forward to account for the erection of these towers. Several of our correspondents had evidently drawn upon their imaginations, whilst others we suspect of making an attempt to "pull our leg!" Whatever was the purpose for which Mystery Towers were intended they certainly were not erected to "support a body of fishermen with stores of bait and rods and lines, to keep the country supplied with fresh fish during the submarine blockade." Nor were they intended as "fresh air sanatoria for wounded soldiers and sailors!"

A Twenty-Mile Beam

Many other readers gave a more probable reason for the building of these towers, and one of the most interesting letters in this connection is that from E. Priest (of Southsea) who writes as follows:—

"As you know, during the war most of the important ports and harbours were closed at nights, by booms and nets, in order to prevent hostile submarines from entering. The Mystery Towers were built in order to prevent submarines from passing up a channel or strait, such as the Straits of Dover, and they were really to act like large booms. Two, three, or perhaps more Towers were to have been sunk in the Straits and between them would have stretched minefields. In each tower is a room, appropriately called the "Mystery Room," in which were to be the controls for operating the minefields.

"On Board" for a Fortnight

"One Tower, completed soon after the war, is now serving in the place of the old Nab lightship, and goes by the name of the Nab Tower. This Tower is sunk in 70 ft. of water, and the height of the lamp above high water mark is 80 ft. The lamp, which is only 18 ins. in diameter, is of 18,000 c.p. and projects a beam that can be seen for 20 miles. For as small a lamp as this, the distance quoted may seem to be exaggerated, but it is really the reflectors which actually project the beam. The lamp is electric, and is moved by clockwork. To ensure it being always level and in a smooth running position, it revolves on a bed of mercury.

"The outer facing of the Tower is of steel plates, with lattice girders, behind this is a wall of concrete, and then more steel plates. I am not certain of the actual thickness of the walls. Under the water are the large concrete terraces, which can be seen in the photo you published in the "*M.M.*" Stores are kept in the basement of the Tower, including food and oil and the other necessaries. Besides these are the motors for driving the dynamos for the electric supply, and also the machines used when any repairs are needed. There is, of course, a boat which is kept on the Tower. The men are out on the Tower for two weeks, and in rough weather sometimes for longer. Then they are relieved and brought ashore, where they stay for three weeks at work in the dockyard."

10,000 tons of Reinforced Concrete

Since the above-mentioned letters were received from our readers we have made further enquiries about the Mystery Tower Ships, as they were called. As a result

we have come to the conclusion that these great structures were undoubtedly designed for purposes of coast defence.

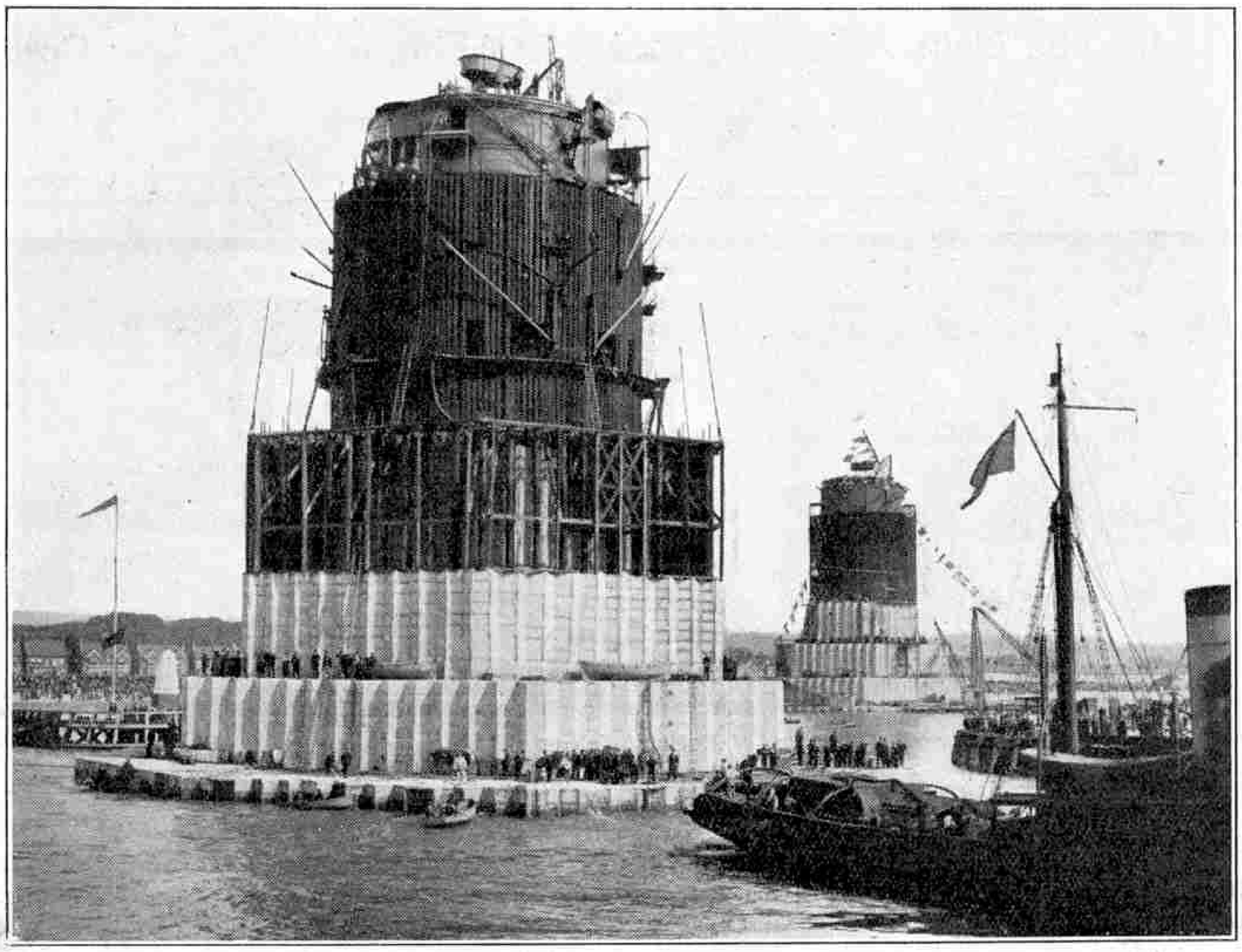
Their height over all was 180 ft., the diameter of the concrete base about the same, and the total weight was calculated to be some 10,000 tons. The base and the four lower decks were built of six-sided hollow concrete blocks, which in section resembled honeycomb. About 100,000 blocks were required to form the base of one Tower, the total weight of the blocks being about 9,000 tons, the other 1,000 tons being accounted for by the steel superstructure.

The Towers were designed by Mr. Menzies, a Scottish engineer, and constructed by Mr. H. A. Clift, a Canadian engineer employed by the Ministry of Munitions, who, incidentally, had previously lost an arm during the fighting in France. Each Tower was planned to have six decks, with living quarters for 100 men and accommodation for stores and machinery. The heart of the Tower was to contain a huge electrical generating plant, which was to be used for some secret purpose concerning which no information whatever is available.

Mr. R. Gammon, a Guild member living at Shoreham, has described for us a visit he had to the Tower. He says :—"The steps on the lower portion were made of wood, and appeared to be only a temporary arrangement for the workmen, who were working on the upper part. Apparently there was another stairway inside, but the public were not allowed into this part. The upper portion consisted of numerous small circular rooms one above the other. The walls were covered with coarse cork dust.

"It struck me that the rooms would be very cold and miserable. Some were extremely low pitched and it was amusing to read the numerous warnings painted on walls or girders, etc., such as 'Bob here,' 'Duck your head!' etc.

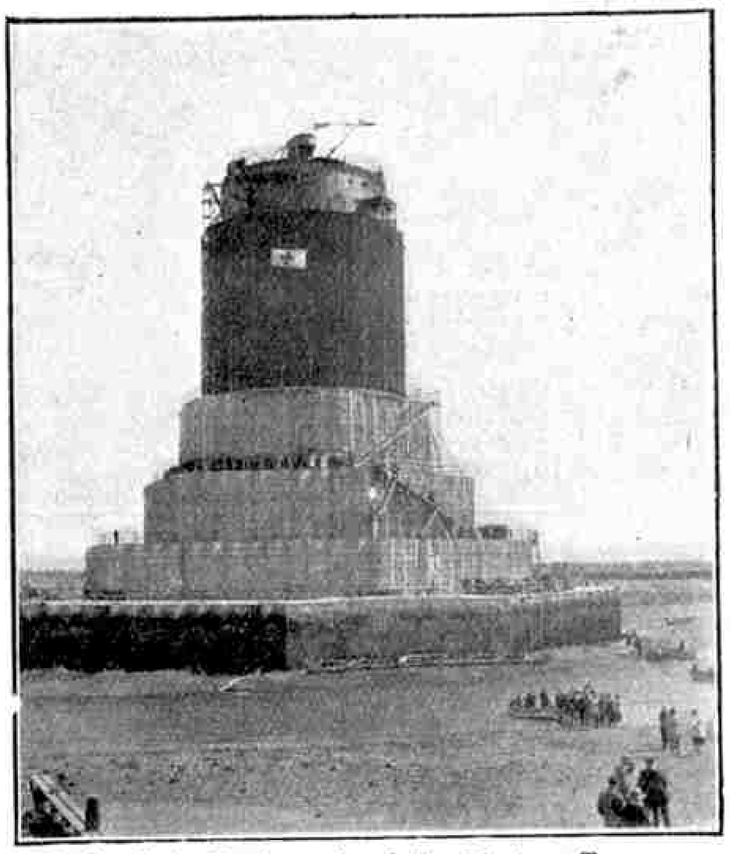
"The ascent from one room to another was made by iron ladders with narrow circular rungs. In one place you were compelled to crawl on your hands and knees from one room to another as the doorway was so small. On the occasion when I was looking over this structure, a rather stout lady became wedged in this opening. After receiving help from an attendant and some of her friends she managed to emerge into the next room but whether she ever got back again—or is still there!—I don't know."



Launching the First Mystery Tower at Shoreham

Fixing the Towers in Position

It was intended that a number of Tower Ships should be constructed and placed around the south coast. The idea was to tow them to the site, where they were to be sunk some 70 ft. in the sea by filling the hollow concrete blocks in the base with liquid cement, which was to be poured through a large number of pipes connected to a temporary emergency deck. The Towers would thus be permanently established and in their final positions would rise some 110 ft. above the sea, constituting strongly fortified islands.



A Reader's Photograph of the Mystery Tower, when opened to the public

It seems remarkable that such ponderous craft as these 10,000-ton Mystery Towers should float, but their great buoyancy is manifest when we learn that they drew only 14 ft. of water! They were easily capable of being towed into position by tugs, even though rising above the water for well over 160 ft.

The Admiralty originally intended to construct eight Towers but only two were built, and neither was actually completed when the Armistice was signed.

Launch of the First Tower

The Towers were constructed at Shoreham, practically at the mouth of the River Adur. The launch of the first is described as being an impressive spectacle, witnessed by thousands of people despite the secrecy that had been maintained. One Sunday morning six powerful Admiralty tugs, sent down from Portsmouth, pulled with the tide and strained at their hawsers until the massive Tower began to move. Imperceptibly at first, but slowly and steadily gathering headway, it was towed and guided by masterly seamanship through the harbour entrance, which was cleared only by 2½ ft. on each side. Although the depth of the fairway had been increased by dredging operations, there was only a clearance of 5 ft.

Having successfully negotiated these obstacles the Tower started on its voyage of 41 miles in the open sea to its final anchorage in the Solent, between the mainland and the Isle of Wight. The voyage took 20 hours but at last the Tower was sunk in 70 ft. of water, by filling the base with liquid cement as already described. Here, on the site of the Nab Lightship, it is to-day serving the same purpose as did the lightship, and is now known as the Nab Tower.

The "Stone-Battleship" at Manila

The idea of the Mystery Tower ships probably originated in the massive "Stone battleship" known as "El Fraile," with which the United States Navy defends the entrance to Manila Harbour.

This fortification, which is illustrated in diagramatic form on the previous page, is built on a conveniently-placed rock between Luzon and the island of Corregidor, the rock having been hollowed out to form its base. It consists of three submarine decks, which extend to a depth of 70 ft. below the surface of the sea. On the lowest deck—equivalent to the stoke-hold on board ship—are huge oil reservoirs, while immediately above are the Diesel engines that provide the necessary electrical power for lighting and heating. Ad-

(*Continued on page* 246)

The Conquest of the Air

XIII. The Light Aeroplane Clubs: Learning to Fly at Low Cost

By C. G. Grey (Editor of "*The Aeroplane*")



Two De Haviland "Moths" Taking Off with Passengers

WHEN I was a boy the ambition of every youngster was to become an engine-driver on a railway—there were no motor cars in those days. As the next generation grew up, every boy (and many girls) wanted to drive motor cars—and now that they are grown up most of them do it! To-day, everyone wants to fly, and most of my young friends are not content to fly as passengers but want to be pilots.

Unfortunately flying is rather an expensive game. Aeroplanes cost a great deal of money, because everything about aviation has to be so light and at the same time so strong that a vast amount of labour is used simply in cutting away weight that does not do any useful work. Every small part in an aeroplane has to work for its living. All the engine parts have to be cut down to the last fraction of an ounce, just as all the parts of the aeroplane itself have to be carved and drilled till there is not an ounce of unnecessary weight anywhere.



Front view of the "Moth"

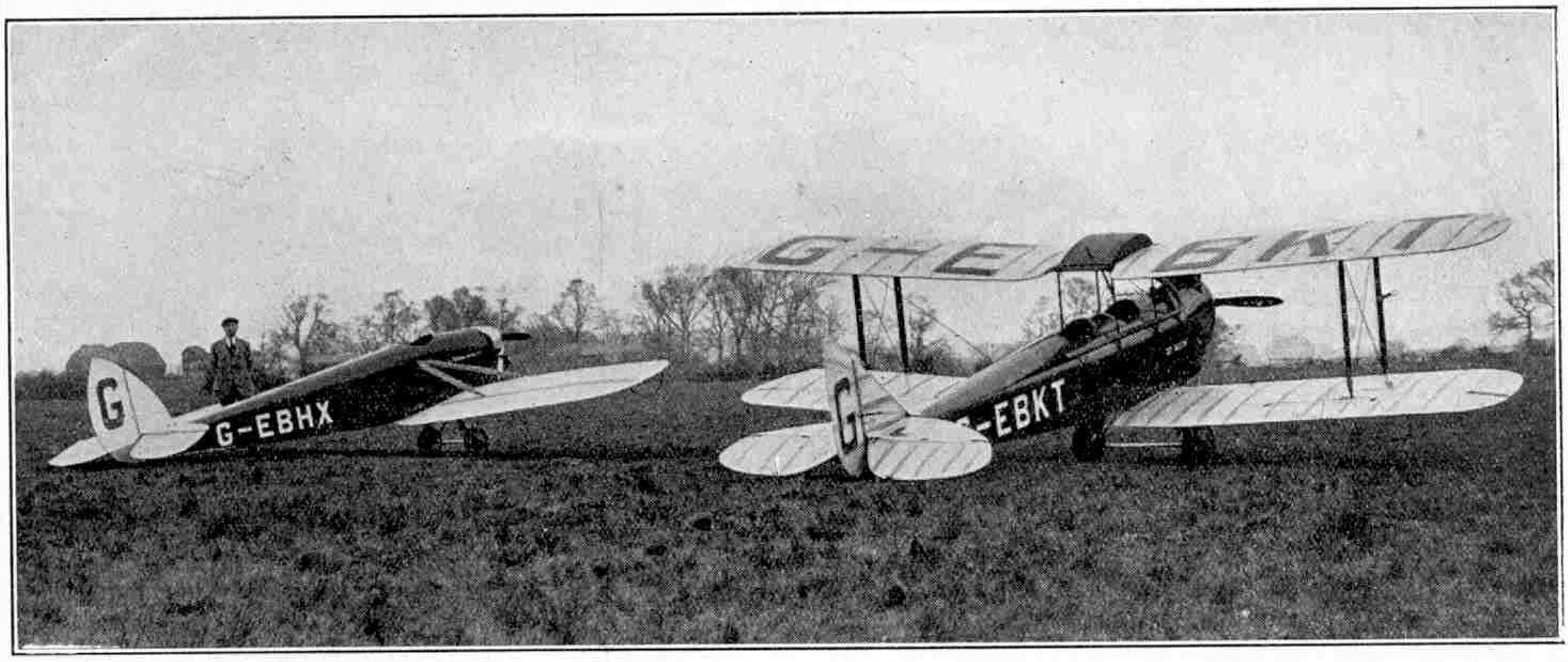
Why Aeroplanes cost so much

Some idea of what this lightening process means may be gained from the Napier "Lion" engine, which is at present about the lightest engine in the world for its power. Here the original block of steel, from which one cylinder of the twelve cylinders is produced, weighs 100 lbs. when received in the factory, but only weighs 10½ lbs. when it has been completely machined ready to put into the engine! It is not only the turning into scrap metal of almost 90 lbs. of good steel that costs the money, but the amount of labour and machining necessary to remove it that puts up the cost.

Even the "Light Aeroplanes" that have become so popular during the last few years cost a lot of money. It might be thought that, on account of their small size, these aeroplanes ought to be a good deal cheaper than they are, but as a matter of fact there is very nearly as much labour used in making all the small parts from which they are constructed as there is in making the bigger parts that do the same work in bigger aeroplanes. Therefore flying cannot become a game that everybody can play at until the cost is reduced very considerably.

There are two ways of making anything at low cost. One is to make it in vast quantities in a big factory and the other is to make it one at a time in a very cheap way. For example, you can buy a cheap pair of boots from a factory in Northampton that makes thousands of pairs a day, or you can buy a cheap pair from a small bootmaker who sits in his own shop and works with the simplest tools and pays a very low rent.

The earliest aeroplanes were made in the latter way, in wooden sheds built on aerodromes, and the owners of the machines worked themselves like ordinary workmen and so those aeroplanes did not cost much. During the War, 1914-18, aeroplanes were turned out in vast quantities all exactly the same, like American motor cars, and they were produced fairly cheaply. But to-day aeroplanes are built in those same great factories and so few are built that each one costs a great deal of money.



D.H. Type 53, "Humming Bird," and D.H. Type 60, "Moth"

Of all the light aeroplanes that are being flown to-day the De Haviland "Moth," with a 60 h.p. A.D.C.-Cirrus engine, is the most popular. The aeroplane is big enough and the engine is powerful enough to carry a pilot and passenger quite comfortably at about 80 miles an hour and it is really quite economical to run so far as petrol and oil are concerned. In fact it does not cost any more to run than does a motor car of medium size. But it costs £800 to buy. And there are very few young men who want to fly who can afford to spend £800 on an aeroplane and also pay for a mechanic to keep it in order and pay for its housing on an aerodrome and so forth.

Object of the Clubs

You see, if you keep an aeroplane on an aerodrome, you also want a motor car to take you to the aerodrome, so that really you have to spend some hundreds of pounds on a motor car as well as the £800 on the aeroplane! And when a young man has so much money as that to spend, he generally has quite a lot of other responsibilities in life, and has a social position to keep up, so that his £800 aeroplane becomes very much of a luxury.

At the same time there are many men who are really young enough to fly and can quite well afford to spend £100, £200 or perhaps £300 a year on flying for fun. And so, to give them a chance of enjoying their hobby, the Royal Aero Club, in conjunction with the Director of Civil Aviation at the Air Ministry (Air Vice Marshal Sir Sefton Brancker), organised the light aeroplane clubs that are now operating at Stag Lane, near Edgware, for the London area, and at Manchester, Leeds, Birmingham and Newcastle-upon-Tyne.

The Air Ministry bought two De Haviland "Moths" for each of these clubs and the members are endeavouring to raise in one way or another enough money to buy or build some more light aeroplanes.

Lancashire's Good Start

So far the Lancashire Aero Club, which operates at Manchester, has been the most fortunate. Sir Charles Wakefield, of "Castrol" oil fame, has presented a third "Moth." Sir William Letts, of A. V. Roe & Co. Ltd., has promised another light aeroplane, and the Motor Trade and the Brewing Trade of Manchester have promised a couple more. So Lancashire is living up to its motto, "What Lancashire thinks to-day England thinks to-morrow."

These clubs, by working on the co-operative principle, have made flying a sport that is, at any rate, quite as economical as motoring. The members pay a guinea a year subscription. When they want to learn to fly they pay 30/– an hour while under instruction. That includes paying for the pilot's time while he is in the air with them, and paying for the cost of petrol and oil, insurance, and indeed everything else.

After a member has learned to fly, and has qualified for the Air Ministry's "Class A" certificate as an aviator, he can then hire the club machines at £1 an hour to fly by himself. He is entitled then to take up a passenger, if a friend cares to trust himself or herself with the newly fledged pilot.

Eighty Miles for £1

Thus, as the speed of the "Moth" is about 80 miles an hour, two people can travel about 80 miles for £1, which works out at 1½d. a mile each. And that is considerably cheaper than a first-class railway fare, or even hiring a car.

Apparently this very low price is only possible because the aeroplanes have been presented to the clubs in the first place. If each club had to find its £800 per aeroplane and had to reckon the interest on that money as part of the running expenses, which would be the only sound financial way of doing it, we can quite understand that the price of hiring the machines would have to be raised somewhat. But, even so, club flying, or "co-operative flying" as it is to be called, would still be cheaper than hiring motor cars or travelling by rail.

These light aeroplane clubs are becoming immensely popular each in its own district. Already they are up against the trouble that so many members want to fly that there are not enough hours in the day to accommodate them all with the aeroplanes that are available! And, of course, if one of the machines is laid up with some little engine trouble or some slight damage, even to a wheel or a tail skid, it means that there is just that much less flying time available for the members.



The "Moth" at Stag Lane, the London Aeroplane Club's Aerodrome, and its Shed

It is quite clear already that if each of the clubs had many more aeroplanes much more flying would be done, and then many more members would join, and so the whole sport of flying would increase. First of all more machines, then more flying, then more members, then more machines to accommodate the increasing number of members, and then more flying, and so on.

But the trouble is that the clubs all want more money to buy the necessary more machines. They are just in the difficult position between the man who makes boots in his own shop and the man who makes boots in a great factory, when what are called the "overhead charges" are going up and there is not yet sufficient demand to bring down the price again.

The De Haviland Company say that if they could build their "Moths" in hundreds instead of in half-dozens at a time they could bring the price down to perhaps £500 instead of £800. If they could do so no doubt each of the clubs could raise an extra £1,000 or so to buy a couple more machines. And so the amount of flying would increase enormously. Anything that will reduce the cost of aeroplanes and engines will go far towards increasing the number of members of the clubs and so will increase the amount of flying that will be done.

Apart from reducing costs simply by building in greater numbers, there are always possibilities of devising methods of construction that will either use less material or will save labour, and so will reduce costs even further. One of the cleverest of American aeroplane designers, Mr. "Bill" Stout, of the Stout Metal Airplane Company, which is now a branch of the great Ford automobile concern, told me not long ago that he has a motto stuck up all over his design office reading :—"Simplicate and add more lightness." This is a motto that every engineer might well follow and it is particularly suitable to aircraft engineers. Some of our aeroplane builders are already realising what it means.

Not long ago one of our best known aeroplane constructors, Mr. Fred Sigrist, of the Hawker Engineering Company, showed me details of the construction of the new Hawker "Heron," and you "*M.M.*" readers will be interested to know that he described it as being : "As simple to put together as a Meccano model." The whole of the body-work, or "fuselage" as it is called, is built of square steel tubes bolted together through flat steel plates. It really is exactly like Meccano construction. Not only is this method of building cheap in itself, but if the demand for aeroplanes were enough to make it worth while to build them in what is now called "mass production" quantities, all these tube parts could be cut off in lengths and drilled and bolted together by what is practically unskilled labour.

More recently I was shown a new method of building aeroplane wings by which steel strips of a special channel section could be bolted together—also on the Meccano principle—in a way that will reduce the cost of production enormously. And still more recently I have seen yet another method of combining wood and metal construction in wings that (dare I say it to "*M.M.*" readers ?) even beats Meccano methods for quickness and simplicity, and at the same time does not need any very elaborate machinery to make the various parts.

By these methods "simplication" seems almost to have reached its limit so far as the aeroplane itself is concerned.

The next step must be the simplication and cheap production of the engines. At the present moment we have to pay something like £200 for a reliable engine that is at the same time powerful enough and light enough to be used in an aeroplane. But it is possible to buy quite a powerful motor car engine, for about £70 or £80. And if a suitable engine for an aeroplane could be bought at that price it should be possible to sell a complete aeroplane, quite powerful enough to carry a pilot and one or two passengers, for at any rate £400 and quite possibly £300.

If we could only get down to the £300 aeroplane, not only would the various flying clubs be able to buy a lot more machines and do a lot more flying and get a lot more members, but quite a number of comparatively well-to-do people could afford to buy their own aeroplanes. Possibly these would be bought on the hire-purchase system, and kept at the club aerodromes, where they could be kept in order by the club's mechanics. Probably aeroplanes at such a price will be offered for sale within the next two or three years.

By such methods as these we shall in due course make flying quite a cheap amusement, and I believe that when you boys and girls have left school and are in business, making a living for yourselves, it will cost you no more to fly than it costs the young man or woman of to-day to run a motor bicycle.

Back from the Cape

Mr. Alan Cobham and his colleagues of the great flight to the Cape, arrived at Croydon Aerodrome on Saturday, 13th April, on the return journey. Long before Mr. Cobham was due to arrive, hundreds of pairs of anxious eyes were scanning the horizon and each minute the crowd of watchers became greater. In addition to two huge sixteen-seater passenger 'planes of Imperial Airways, six D.H. Moths, one of which carried Mrs. Cobham, took the air to form part of an escort for the last few miles of the journey.

Later in the day Mr. Alan Cobham went to Buckingham Palace to deliver to the King a letter which he had brought from the Earl of Athlone, Governor-General of South Africa. In the evening Mr. Cobham gave a short broadcast speech from 2LO in which he disposed of the suggestion that his flight was for the purpose of initiating an aeroplane service between London and Cape Town. The only practicable service would be by airship. Several excellent intermediate aeroplane routes had been found, notably that between Cairo and Central Africa, which would reduce the mail times to and from London from one month to seven days.

The journey home resolved itself into a race between the D.H.50 and the mail steamer "*Windsor Castle*," which left Cape Town on the same day as Mr. Cobham, 26th February. At first sight the race would appear to have been a simple task for an aeroplane travelling at 100 m.p.h., but it should be remembered that the mailboat had only 5,300 miles to travel, steaming for 24 hours per day, against 8,500 miles to be covered by the airman who, of course, had to spend the nights at different places and make a total of 26 stops.

As the "*Windsor Castle*" was not due to arrive home until 15th March, the D.H.50's performance was excellent. The actual flying time from the Cape to Croydon was just over eighty hours, giving an average speed of over 100 miles per hour.



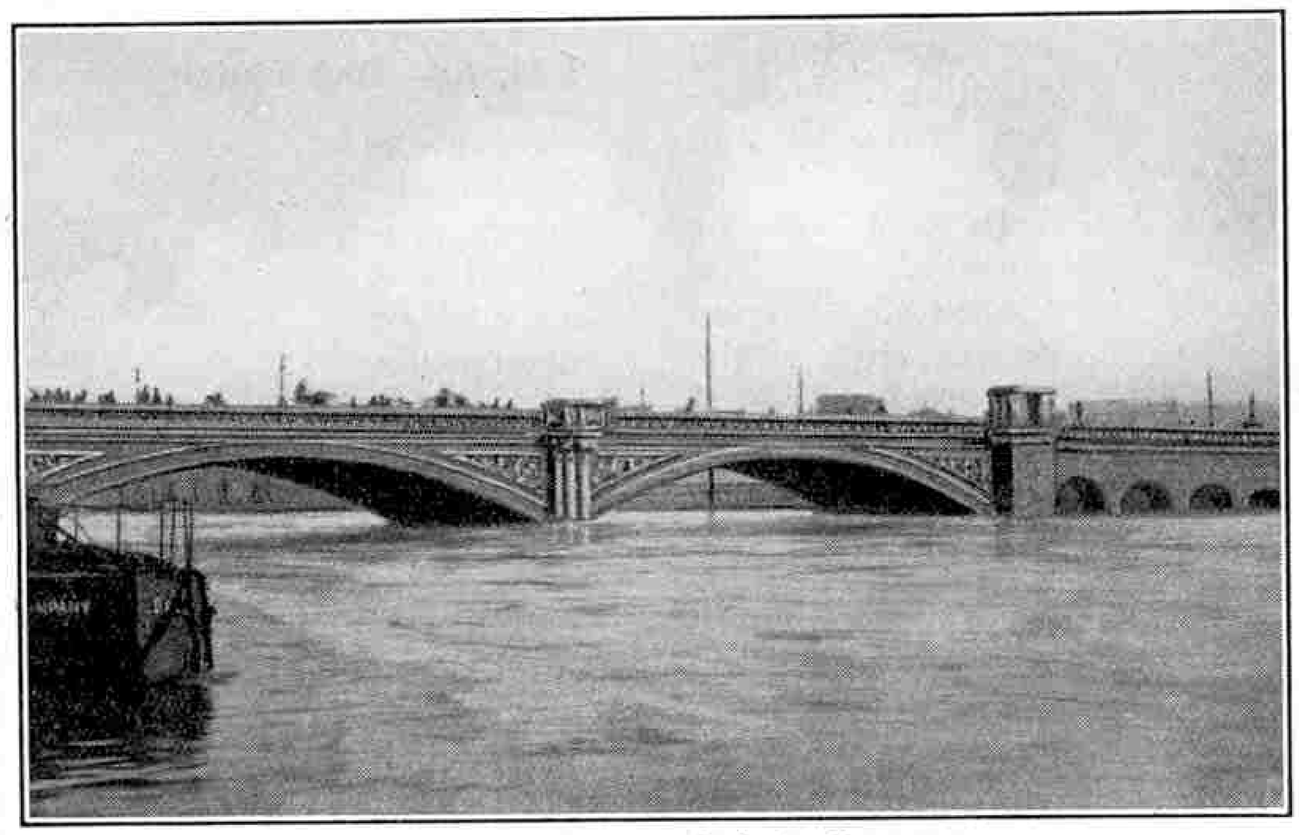
FROM OUR READERS

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for this page are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Widening of Trent Bridge

The widening and improvement of the well-known Trent Bridge is now nearing completion and it may be of interest to give some account of this handsome and interesting structure.

The first bridge at this point of the river was built by Edward the Elder in 924, and except for the stone piers was constructed entirely of wood. This was superseded by one of the first stone bridges in the country, built by Henry II. in 1156. The present handsome iron structure was opened in 1871 and proved entirely satisfactory until after the war, when the enormous increase in motor traffic rendered it inadequate. The City Council realised the necessity of having the bridge widened and strengthened, and having obtained substantial assistance from the Government, commenced operations in March, 1924. From that time until the opening of the new portion of the bridge in October, 1925, four massive derricking cranes were employed continuously and the progress of the work was watched by the public with keen interest.



Trent Bridge as it is to-day

It was desired to preserve the old appearance of the bridge from downstream and therefore the outer decorated arch rib of the old structure was removed to the outer end of the new portion, and likewise the parapet. The old arch ribs are of cast-iron while the new ones are of mild steel. When the new portion was finished the old portion was closed and the roadway stripped. The cast iron ribs were then strengthened by filling in the space between them with reinforced concrete. In addition, the whole of the cross girders and floor decking have been replaced by a stronger structure.

A notable feature of this fine piece of engineering has been that the bridge was never closed during the operations, traffic passing all the time in both directions. If it had been necessary to close the bridge vehicles either would have had to cross the river by the toll bridge at Wilford, a mile further up and quite away from the main road, by Kelham Bridge near Newark, 20 miles down the river, or by Sawley Bridge, some 10 miles further up. Trent Bridge is one of the most important bridges in the country for it is one of the principal connecting links between north and south.

E. K. Lawrence (Nottingham).

A Trip on a Pilot Cutter

I have always taken a great interest in ships and it was with huge delight that I accepted an invitation to spend ten days on the pilot cutter "*W. A. Massey*," of the Humber Pilot Service. The work of this vessel consists in conveying pilots and stores of all kinds to the outer station cutter "*Commander Cawley*," which is anchored about three miles off Spurn Point.

I found myself one of a party of nine boy passengers. They were mostly sons of pilots and some of them had made the trip before. In addition there were eight apprentices, who apparently welcomed our arrival and cheerfully made light of the extra labour entailed by our presence. For the senior apprentice we shall all keep a warm corner in our hearts for a long time to come, remembering the kindly way in which he "fathered" us, one and all. The pilots on board were all extremely good to us and took a kindly interest in all our doings. Imagine the novelty to town-bred boys of sleeping in bunks and living the lives of real "sea-dogs!"

We were fortunate in being allowed to land several times at Spurn and were greatly interested in the fort with its guns, searchlights, machine-gun pits and many other things. The soldiers stationed there found enjoyment even in our juvenile company and the games of cricket indulged in were enjoyed by all who took part. Occasionally we had a sing-song and treated them to selections from our wonderful (?) band. We climbed the lighthouse and amused ourselves in scores of ways known only to schoolboys on holiday.

Spurn itself is a very isolated place. Fresh water has to be taken there daily by a Government steamer from Grimsby, while the nearest railway station is six miles away. A splendid new motor life-boat has recently been installed.

I was the only Liverpool boy in the company, the others all coming from Hull or Grimsby, and I had my work cut out to hold my own in the lively discussions on the relative merits of our respective ports!

This, my first trip, certainly strengthened my desire to enter upon a sea-faring life, but before that time arrives I hope to join once more the happy party on the pilot cutter, next time as one who has "been before."

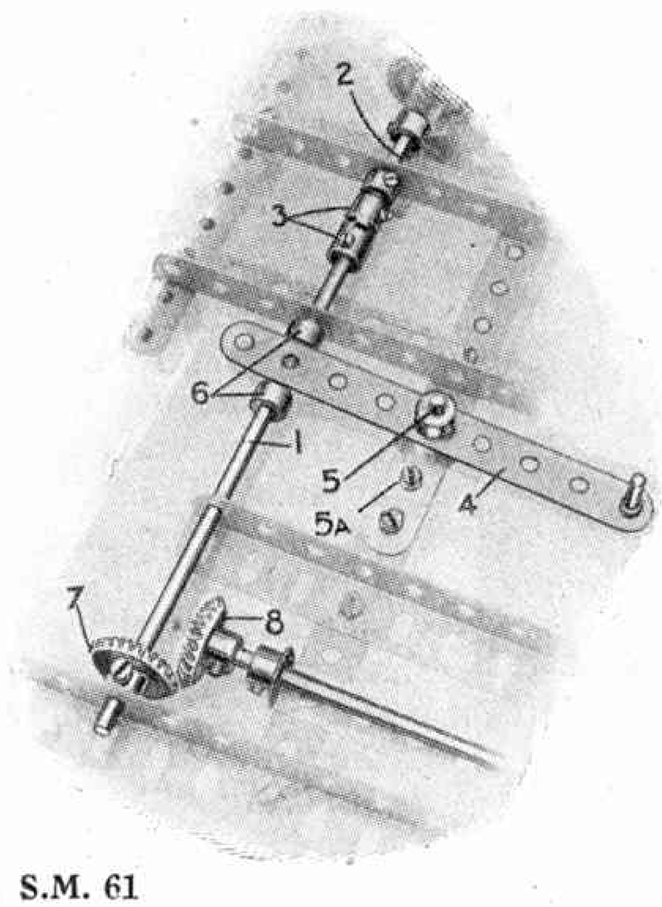
A. Hague (Liverpool).

MECCANO STANDARD MECHANISMS

Section V. Clutches, Reversing and Drive-Changing Mechanism

This article is the sixth of a series explaining some new and interesting aspects of Meccano model-building practice. Gear Ratios, Belt and Rope Mechanism, Pulleys, and Levers have been dealt with already, and the following article describes some simple examples of Meccano Clutches and Drive-changing Mechanism. These movements may be adapted with advantage to numerous Meccano models, and will enhance both their appearance and efficiency in operation.

THE Meccano Dog Clutch (Part No. 144) lends itself to a number of useful movements, and forms an excellent method by which the driving power of a model may quickly be thrown in or out of gear with the driven mechanism while it is in motion. Examples of its use are given in Standard Mechanisms Nos. 61 and 63.



S.M. 61

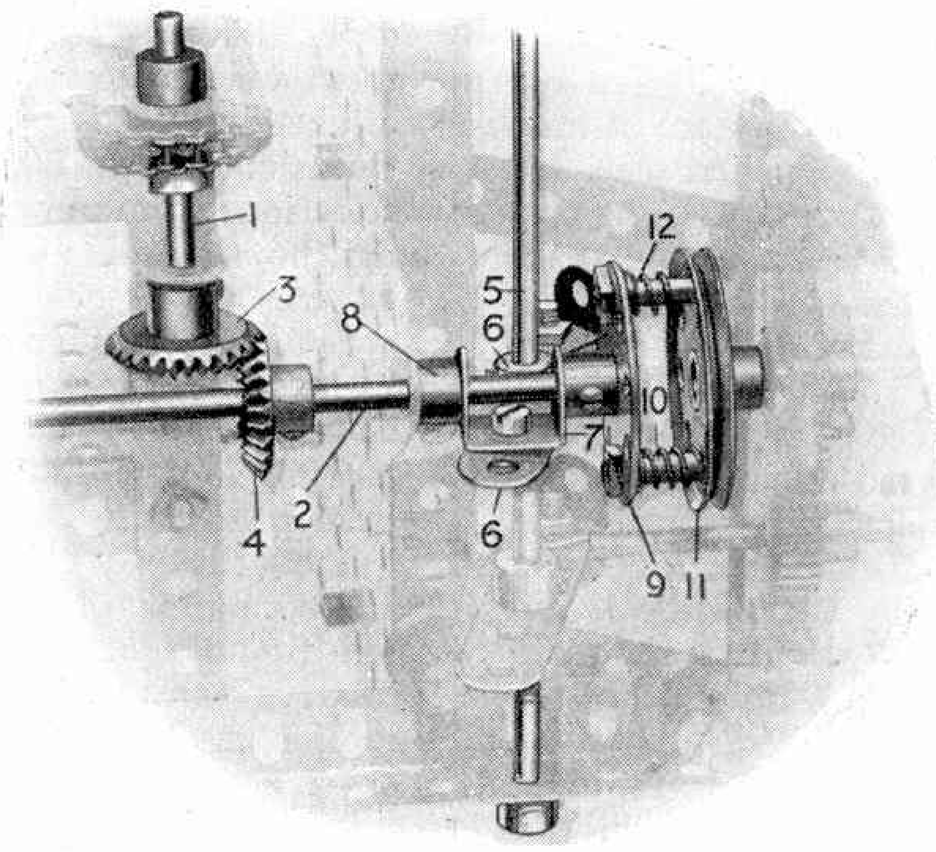
In S.M. 61 the jaws of the Dog Clutch 3, carried on the ends of the two Axle Rods 1 and 2, are brought into engagement on operation of a lever 4, which is pivotally mounted on a short Rod 5 secured in a Crank 5A.

The lever rests between two Collars 6 mounted on the shaft 1. This shaft slides in its bearings, and its movement, in addition to combining the clutch members 3, throws a Bevel Wheel 7 in or out of gear with a similar wheel 8.

S.M. 62—Clutch

This type of clutch is shown fitted to the Meccano Chassis. The clutch is operated by means of the foot pedal 6 pivoted on the shaft 5, which on being pressed down, slides the Rod 2, to which it is connected by the Double Bracket 7 journalled between the Collar and set-screw 8 and the boss of the Bush Wheel 9.

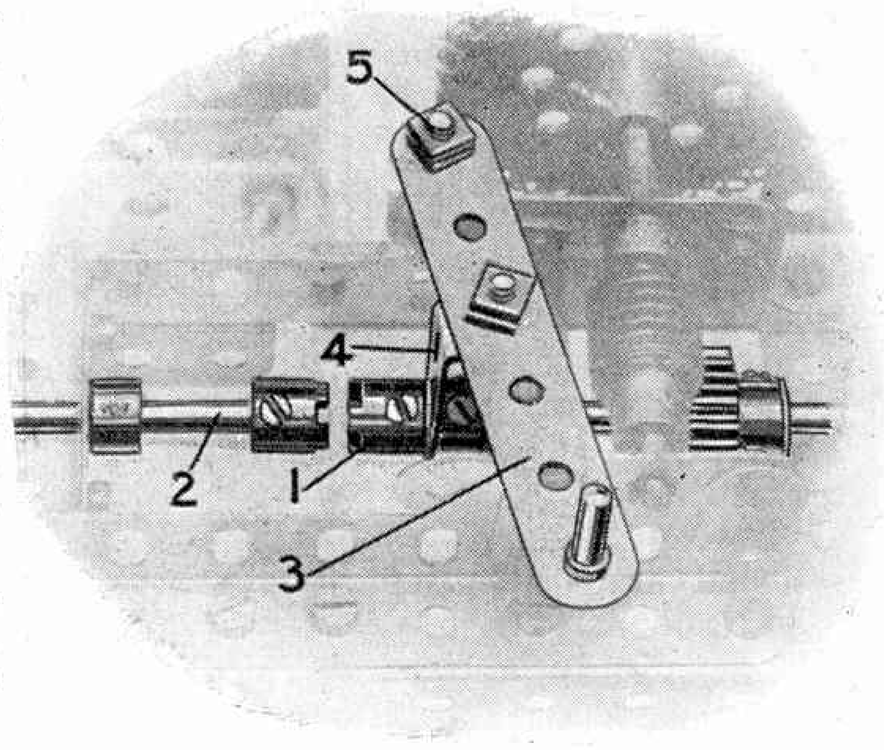
As the Rod 2 slides in its bearings the Threaded Pins 10 bolted to the Bush Wheel 9 are thrust further into the holes of the $1\frac{1}{2}$" Pulley 11, and at the same time the Bevel Wheel 4 is drawn out of gear with a second Bevel Wheel 3 on the driving shaft 1. This allows the engine to revolve freely, while the chassis remains stationary. Immediately the pressure relaxes on the pedal 6 however, the counter-shaft 2 is pushed back into its former position by the springs 12 (extracted from the Meccano Spring Buffers), and the bevel drive 3 and 4 is brought into gear again.



S.M. 62

S.M. 63—Dog Clutch

This standard mechanism provides another illustration of Dog Clutch mechanism. The clutch member 1, carried on a short Rod which slides in suitable bearings, is brought into engagement with the clutch jaws mounted on a further Rod 2, by means of a lever 3. The latter is pivoted (by bolt and lock-nuts) to an Angle Bracket at 5, and also to a Single Bent Strip 4 loosely held between the clutch segment 1 and a Collar and set screw.



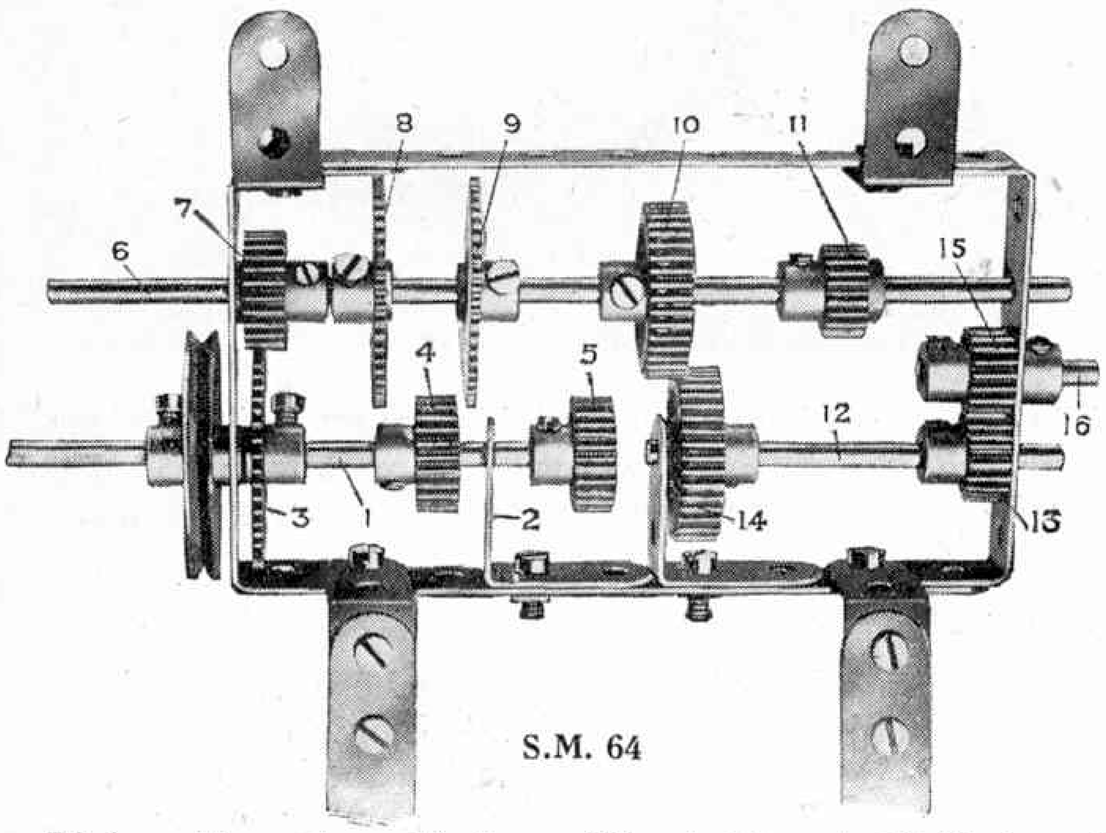
S.M. 63

A considerable improvement is effected by connecting a Spring to the lever 3, in such a manner that it normally holds the clutch members together. This Spring re-engages the shaft 2 immediately pressure is relaxed on the lever 3.

S.M. 64—Drive-Changing and Reversing Gear

S.M. 64 illustrates a compact example of gear box, which provides two speeds and a reverse gear. The model serves well in demonstrating the type of gear box usually fitted to automobiles.

The shaft 1 takes up the drive from the engine. This shaft, which is journalled through one end of the gear box and further supported by a 1″×1″ Angle Bracket 2, carries a 50-teeth Gear Wheel 3 and two ¾″ Pinions 4 and 5. A secondary shaft 6 is also inserted in the gear box and carries one ¾″ Pinion 7, two 50-teeth Gear Wheels 8 and 9, one 1″ Gear Wheel 10 and one ½″ Pinion 11. A further shaft 12 is next mounted in position, and its outer end carries the drive to the road wheels. The Rod 12 carries a ½″



S.M. 64

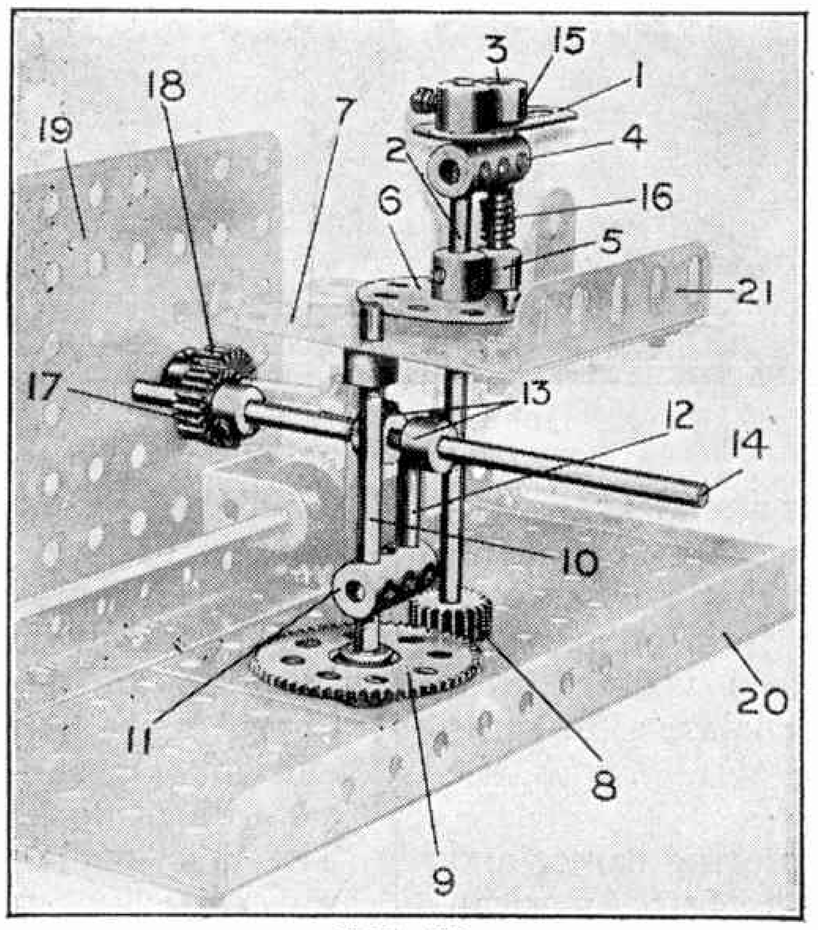
Pinion 13 and a 1″ Gear Wheel 14. A ½″ Pinion 15 secured to a 1″ Rod 16 gears with the Pinion 13.

A lever should be next assembled, and serves to slide the shaft 6 in its bearings. A suitable lever for this purpose will be found in S.M. 52 (see last month's "*M.M.*") and on reference to this detail it will be seen that the Rod A, connected at right angles to the lever by means of a Coupling, may readily be mounted so as to lie transversely across the shaft 6, with its Collar engaging between the Gear Wheels 8 and 9. A movement of the lever will then push the Rod 6 in either direction as required.

The first position of the Rod 6 provides for a "top" speed, and in this position the Pinion 7 is in engagement with the Gear Wheel 3, Gear Wheels 10 and 14 are in engagement, while the Gears 8, 9 and 11 are all free. In this manner the Gear 3 causes the Pinion 7 on the secondary Rod 6 to revolve twice as fast as the primary Rod 1, and the propeller shaft 12 rotates at the same speed as the shaft 6, since it is driven from that shaft through the one-to-one gear 10 and 14. The Pinion 15 revolves idly in this position.

For slow speed the shaft 6 is moved along until the Pinion 7 is out of engagement with the Gear Wheel 3 and the Gear 8 meshes with the Pinion 4, while Gear Wheels 10 and 14 are still engaged. With this arrangement the driving shaft 1 will revolve twice as fast as the driven shaft 12.

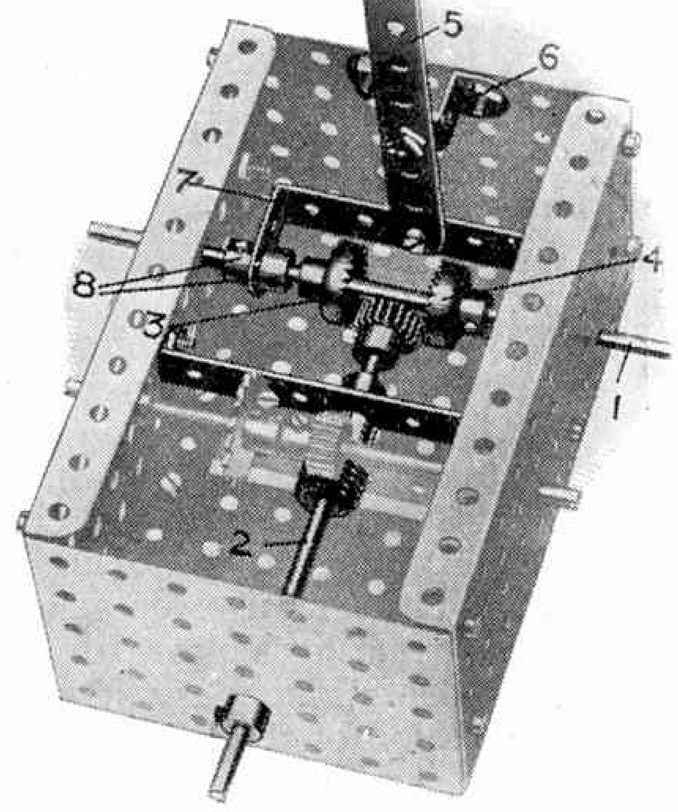
A reverse gear is obtained by sliding the Rod 6 still further, until the Gear Wheel 9 is in engagement with the Pinion 5 and the Pinions 11, 15 and 13 are all in mesh.



S.M. 65

S.M. 65—Drive-Changing and Reversing Gear

A Crank 1, secured to the vertical shaft 2, carries a short Rod 3 loosely journalled in a Coupling 4 also secured to the shaft 2. The short Rod 3 protrudes slightly from the lower Collar 5 and enters a hole in the Bush Wheel 6 bolted to the Plate 7. The Rod 2 is loosely journalled through this Bush Wheel 6 and engages, by means of the Pinion and 57-teeth Gear Wheel 8 and 9, a further Rod 10. The latter carries in a Coupling 11 a short Rod 12 which engages between two Collars 13 on an intermediate driving shaft 14. This shaft 14 is thus moved to and fro in its bearings by lifting the Collar 15 and moving the Crank 1 to left or right until the Rod 3, actuated by a small spring 16 (extracted from the Meccano Spring Buffer, Part No. 120A), snaps home into the next hole of the Bush Wheel 6. The central position of the Rod 3 enables the shaft 14 to revolve freely, but the movement of the Rod to the next hole in the Bush Wheel brings the Pinion 17 into gear with another Pinion 18, whilst a move of one hole in the opposite direction brings further Pinions (not shown in the photograph) secured to shaft 14 into engagement with Gear Wheels carried on a further driven shaft (also not shown).



S.M. 66

Thus this movement may be utilised (a) to throw the Motor out of gear with—say—the road wheels of a tractor, (b) to drive the same forward at reduced speed, and (c) to reverse the direction of their rotation.

It should be noted that in our illustration a side plate corresponding to that shown at 19 has been removed in order to disclose the mechanism. Normally this plate is bolted to the Girders 20 and 21 and so forms a bearing for the shaft 14.

S.M. 66—Reversing Gear

The driving shaft 1 is caused to engage a ½″ Pinion on the secondary shaft 2 through one or other of the ¾″ Contrate Wheels 3 and 4. The change is effected by a lever 5 pivoted to a Double Bent Strip 6 and carrying a 2½″×1″ Double Angle Strip 7, through which the driving shaft 1 is journalled. The Double Angle Strip is held in place on the Rod 1 by means of Collars and set-screws 8. The direction of rotation of the Rod 2 varies according to the Contrate Wheel which drives it.



Lives of Famous Engineers

XXVII
JOHN RENNIE
CANALS, BRIDGES AND HARBOURS.

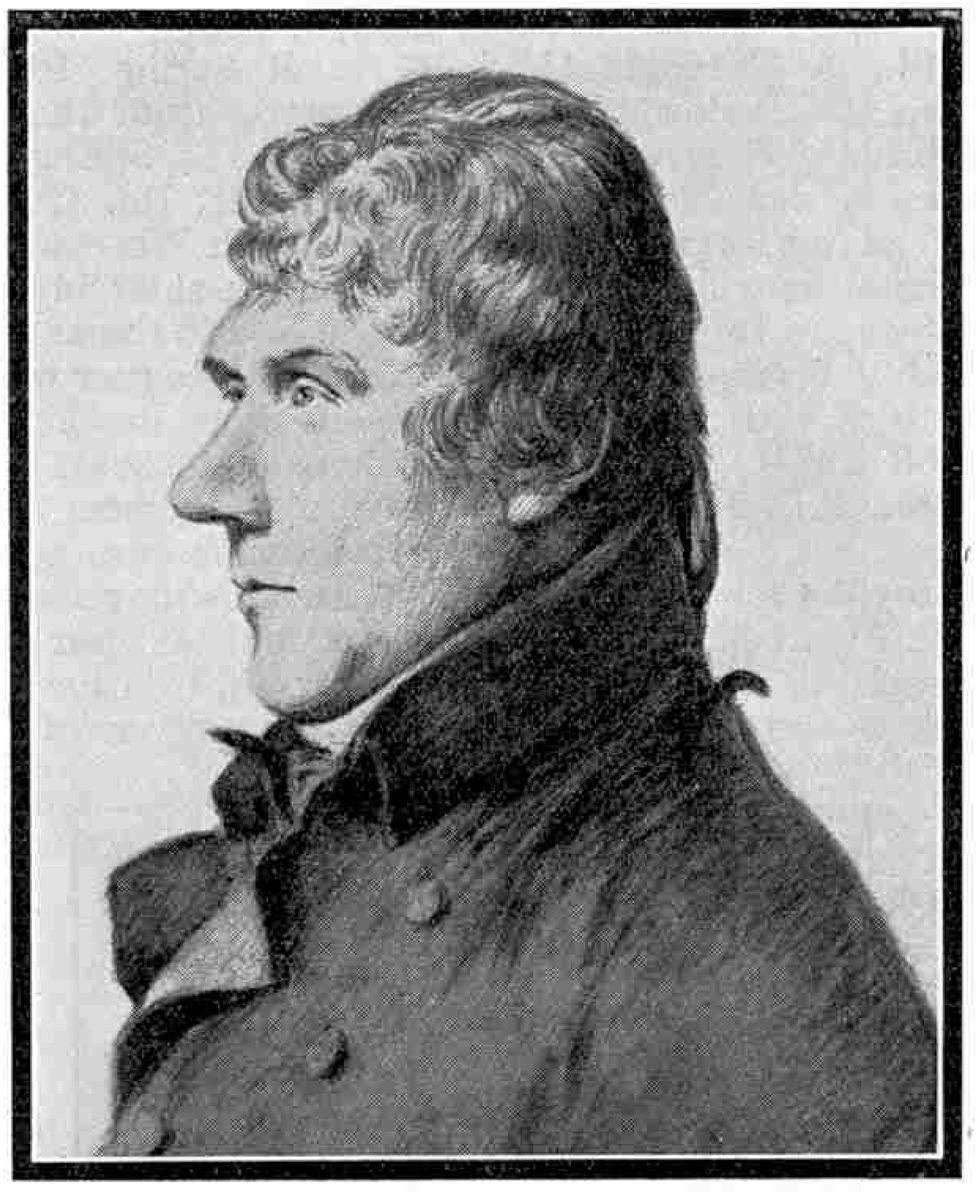
JOHN RENNIE, the architect of three great London Bridges and the engineer of the Plymouth Breakwater, was born on his father's farm estate at Phantassie in East Lothian, Scotland, on 7th June 1761. This small estate was situated about half way between Haddington and Dunbar, and had been the property of the family for generations.

At that time agriculture in Scotland was in a very backward condition. Very little real cultivation of the land had been done, and clover, turnips and potatoes had not yet been introduced. No cattle were fattened, indeed even the hardy black cattle could scarcely find enough herbage to keep them alive throughout the winter. Rennie's father was considered to be one of the best farmers in the district and it is recorded that he was one of the first to introduce turnips as a regular farm crop.

The Rennie Family

Farmer Rennie died in 1766 leaving a family of four sons and five daughters. George, then 17 years old, was the eldest, and from that time he managed the farm and acted as the head of the family. The year before his father's death George had visited many farms in Berwickshire in order to learn the latest methods in use there, and on his return to Phantassie he introduced so many improvements that his farm became regarded as a model throughout the district. His reputation extended even beyond his own country and became so great that he was consulted on farming matters by visitors from all parts of Europe. Among his most distinguished visitors at a later period was the Grand Duke Nicholas, afterwards Emperor of Russia, who stayed several nights at the farm.

William, the second son, chose a seafaring career and was taken prisoner and died during the first American war. The third son, James, became an Army surgeon and was killed in India at the seige of Seringapatam while dressing the wounds of his commanding officer under fire. John, with whom we are now concerned, was the youngest son and was only five years old when his father died.



John Rennie, F.R.S.

Andrew Meikle

Like many other of the engineers whose lives we have already described in the "*M.M.*," Rennie displayed his mechanical inclination and ability at a very early age. When he was six years old his favourite toys were his knife, hammer, chisel and saw, and the ordinary toys that delighted his companions did not interest him in the least. His greatest joy was to visit the smith's and carpenter's shops in the neighbouring village of Linton, watching the men at work and trying the various tools for himself whenever he was allowed. His favourite resort of all, however, was the millwright's shop of Andrew Meikle, a few fields away by the side of the river Tyne.

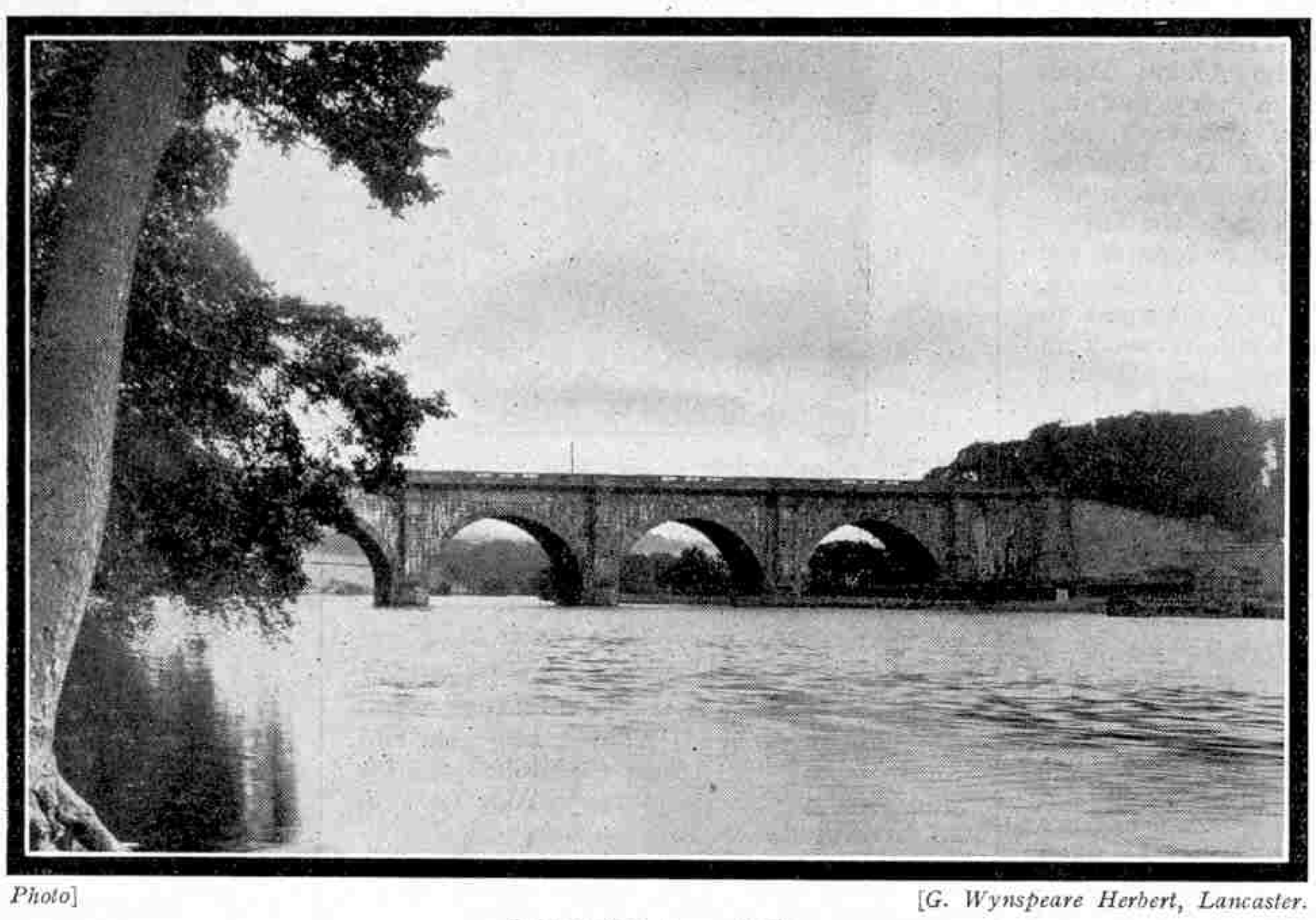
Meikle was a particularly ingenious mechanic and he settled at Houston Mill on the Phantassie estate where he occupied himself as small farmer, miller and millwright. He himself fitted up the machinery of the mill, adjoining which was his workshop. At that time there were very few mills in the district, but Meikle's reputation for skilled workmanship was so high that his services were in great demand for repairing or fitting up mills over a wide area.

The agricultural machinery of that day was exceedingly primitive and Meikle soon turned his attention towards improving it. In particular he sought to construct an efficient threshing machine and after some years of experimenting he succeeded in perfecting his invention. The first machine on Meikle's principle was driven by water power and proved thoroughly successful, and shortly afterwards he erected a similar machine, only driven by horses, for George Rennie at Phantassie.

The patent for this invention was taken out in 1788. Unfortunately for Meikle he was not a business man and he allowed unscrupulous people to deprive him to a large extent of the fruits of his invention. John Smeaton, who knew Meikle intimately, used to say that if he had possessed more 'push and go' he would have been one of the first mechanical engineers of the day.

A Badly Scared Woman

Meikle's great ideal throughout his life was to introduce machinery in every possible situation in order to save labour, and his own household was full of mechanical contrivances. We are told that on one occasion a woman came to his mill with some barley to be ground and was asked to sit down in the cottage while the work was being done. No sooner did the mill wheels commence to turn, however, than a cradle and a churn in the cottage began to rock and revolve respectively. There was no one else in the cottage at the time, and the woman was convinced that some supernatural agency was at work and rushed away scared out of her wits. In view of such incidents as this it is not surprising that Meikle's neighbours declared that he was "no canny!"



Photo] [*G. Wynspeare Herbert, Lancaster.*

Lancaster Aqueduct

A Shock for the Butler

Meikle often travelled considerable distances to instal or repair pumping apparatus. On one occasion he had undertaken to supply a gentleman's house with water. It happened that various other mechanics had undertaken this task and failed, and consequently the butler had little faith in the success of the latest effort. Meikle promised that he would send in the water next day and asked the butler to have everything ready. The butler's reply was: "It will be time enough to get ready when we see the water." Meikle said nothing, but got his machinery to work very early the next morning, and when the butler got out of bed he found himself up to his knees in water!

Meikle lived to the great age of 91 and apparently was in good health almost to the last. We are told that at a family gathering less than a year before he died he played his favourite instrument, the Northumbrian bagpipes, to provide music to which his six sons and their families danced. One wonders how many men of 90 could tackle the bagpipes!

Early Tuition

When Rennie began to go to the parish school at Prestonkirk he had to pass Meikle's shop and frequently temptation was too strong for him and he played truant. Meikle took a strong liking for the boy and let him have the run of his workshop, besides giving him valuable advice in the use of the various tools.

In spite of occasional truancies Rennie made good progress at the parish school and by the time he was 12 years old it was thought advisable to transfer him to a better school. There appears to have been some difficulty in deciding upon his next school and in the meantime the boy occupied himself with making models of various kinds. Models did not satisfy him, however, and he became extremely anxious to tackle more serious work. He therefore set to work to persuade his mother to allow him to go to Meikle to learn to be a millwright and finally his persuasions were successful. For two years he worked hard under Meikle's supervision at smith's work, carpenter's work and millwright's work, and acquired mechanical skill that was of great value to him in later life. At the end of two years he was sent to Dunbar High School where he quickly outstripped his school fellows, particularly in mathematics.

On leaving school finally he returned to Phantassie with the intention of commencing an engineering career. He spent much time in the workshop of his friend Meikle, assisting him in various ways, and before long he became entrusted with the repair of mills in cases where Meikle could not undertake the work himself. At the age of 19 we find Rennie engaged in fitting some new mills near Dundee, designing both buildings and machinery and superintending their erection. Shortly afterwards he carried out with great success extensive repairs to flour mills near Edinburgh. These early successes brought him into prominence and by the time he was 20 he had as much millwright's work as he could undertake.

Studies at Edinburgh University

Rennie had no intention of remaining a country millwright, however, and he decided to improve his knowledge by studying at the University of Edinburgh. He matriculated in December 1780 and joined the classes of Doctor Robison, Professor of Natural Philosophy, and Doctor Black, Professor of Chemistry. In addition to these studies he set himself to learn French and German and during the three years he remained at the University he worked very hard.

On leaving the University in 1783 he set out to visit the more important engineering works in England in order to widen his knowledge. He first inspected Brindley's Bridgwater Canal and the Liverpool Docks, and from there made his way to Birmingham, where he took the opportunity of visiting the firm of Boulton

and Watt and of presenting to the latter a letter of introduction from his late professor, Doctor Robison. Watt received his young visitor with great kindness and a friendship sprang up between them, which lasted until the death of Watt.

An Offer from James Watt

At that time the steam engine was beginning to be applied to driving machinery in mills and elsewhere, and when Rennie visited the Soho Works a large steam engine was under construction for the purpose of driving the machinery of a large corn mill to be erected in London. Watt knew little of millwork and was in great need of a skilled millwright to superintend the work in London at what was to be known as the Albion Mills. Rennie appeared to be a very suitable young man to undertake this task, and after Watt had consulted Dr. Robison and obtained a highly favourable reply, he invited Rennie to undertake the supervision of the proposed mills, as regards the planning and erection of the machinery.

At that time Rennie had returned to Scotland and was very hard at work in superintending the building of his first bridge across the Water of Leith, about two miles west of Edinburgh. Rennie decided to accept this offer, and after finishing the work in hand he set out in September, 1784, for Birmingham, where he remained for two months, during which he acquainted himself fully with the details of the engines by which the mill machinery was to be driven. He then went to London.

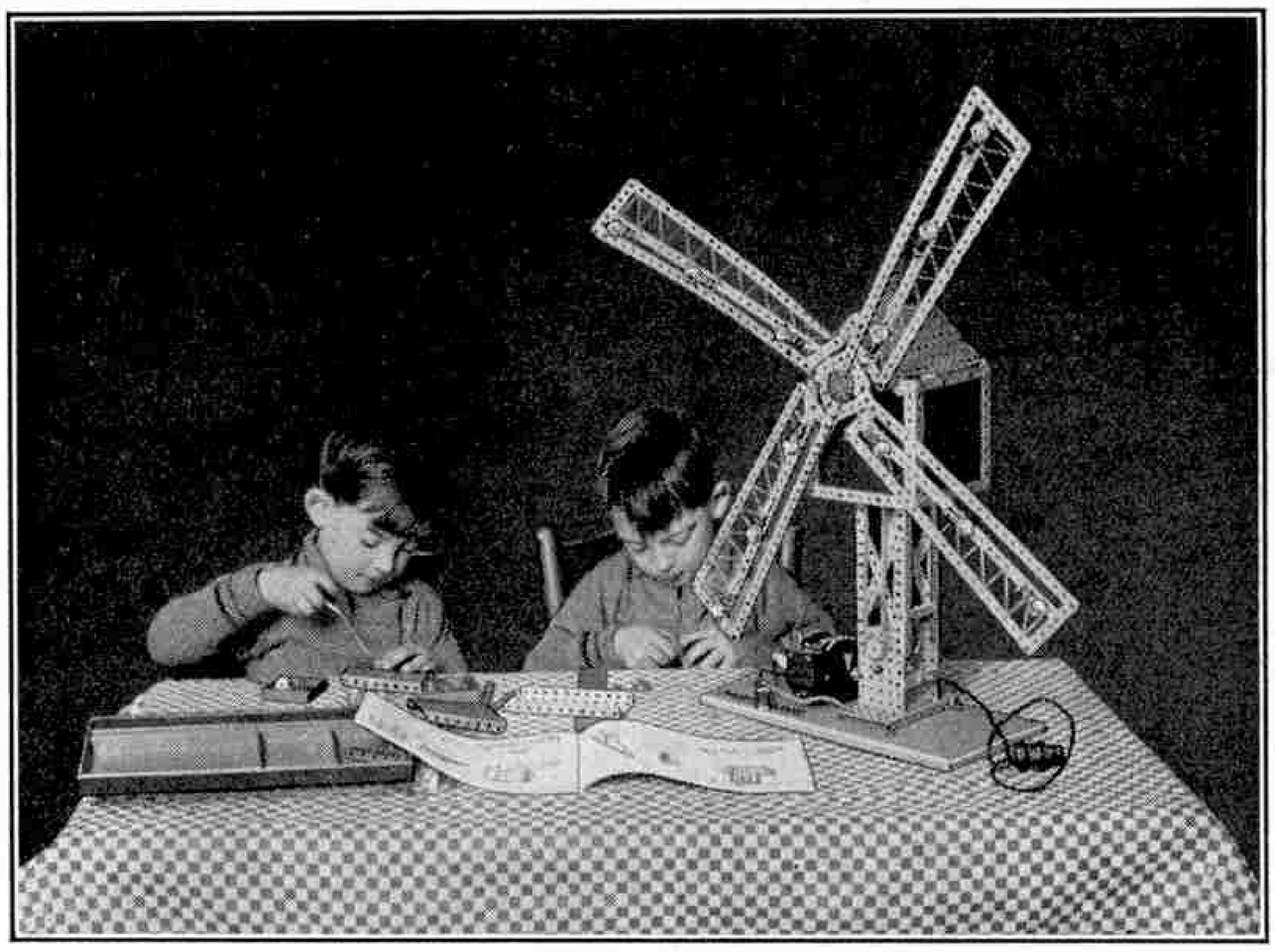
The Albion Mills

The Albion Mills were erected on the bank of the Thames near the south-east end of Blackfriars Bridge. The engines for driving the machinery were the most powerful that had hitherto been produced at Soho Works. They consisted of two double-acting engines each of 50 h.p. having a steam pressure of 5 lbs. to the inch. These engines drove 20 pairs of mill stones each 4 ft. 6 in. in diameter, 12 of which generally worked together, each pair grinding ten bushels of wheat per hour. The two engines working together were capable of dealing with 150 bushels an hour, an output far greater than that of any other mill of the time. In addition to its main work the engine power was applied to loading and unloading the barges, and in various other ways.

The details of the machinery were almost entirely worked out by Rennie and the task occupied him nearly four years. Everything was completed in 1788, to the great satisfaction of Watt and to the astonishment and admiration of the public. It is interesting to note that John Smeaton visited the new mills and heartily congratulated Rennie upon his success. The mills were commercially successful and appeared to have a bright future, but unfortunately they were completely destroyed by fire three years after their completion.

The Albion Mills thus disappeared, but they had lasted long enough to establish Rennie's reputation as an engineer and to obtain for him extensive employment. For a time he was employed chiefly in designing and constructing machinery for mills of various kinds, and his first civil engineering work in England was the construction of the Kennet and Avon Canal, a work upon which he spent enormous care.

The Twins are Meccano Boys!



Our photograph shows the twins, John and Alan Robinson, the sons of our Paris Manager. They will be six years old in May and they both speak excellent English and French.

Needless to say, John and Alan are enthusiasts about Meccano, with which they made their first acquaintance when 18 months of age. A Meccano axle rod and a pulley wheel kept them occupied for hours on a railway journey from London to Liverpool!

The boys are very similar in appearance, and of course this leads to many amusing incidents. When they started school the teacher had to ask them their names two days running; the third day, when the question was again asked, Alan replied: "The same as they were yesterday—John and Alan."

Nothing delights them more than a visit to the model-room of our Paris Office and they are both decidedly of the opinion that the Limousine will always be their favourite model.

Rennie's Canals

The Kennet and Avon Canal has a total length of 57 miles and it rises 210 ft. by 31 locks to the summit level and descends 404 ft. on the west side by 48 locks. At the summit it was found necessary to construct a tunnel 500 yds. in length approached by deep cuttings.

Between Wootton Rivers and Devizes the canal had to be cut through chalk and sand and great difficulty was experienced in forming a watertight bed. Even more serious trouble was encountered near Bradford through land slips, and on one occasion seven acres of land slid into the canal and forced the whole down into the river below. This difficulty was surmounted by carrying an elaborate series of small tunnels and cross drains into the hillside. Perhaps the finest architectural feature of the canal was the aqueduct over the river Avon about six miles from Bath.

Among other canals constructed by Rennie was the Rochdale Canal opening up direct water communication between West Yorkshire and South Lancashire. This Canal had to cross the intervening mountain range over which it was lifted from lock to lock. The engineering difficulties involved in the cutting of this canal were indeed very great and the completion of the navigation in December 1804 was rightly regarded as a remarkable piece of work.

Rennie also constructed the Lancaster Canal with its handsome aqueduct over the River Lune. A survey for this canal had been made by Brindley in 1772, but nothing was done until some twenty years later when a canal company was formed with Rennie as engineer. The aqueduct over the Lune is the principal architectural work on the canal. It consists of five semi-circular arches each of 75 ft. span, the surface of the canal being 62 ft. above the average level of the river. The total length of the aqueduct is 600 ft.

Another of Rennie's canals had a curious origin. A waterway known as the Grand Canal had been constructed to connect the navigations of the Liffey and the Shannon, and although it was badly designed it proved profitable. Among the committee of management was a retired shoemaker who upset his colleagues by meddling with the result that he was snubbed on every possible occasion. The shoemaker was furious at this treatment, threw up his seat on the committee and announced his intention of starting a rival canal. He was laughed at, but he set to work, organised a company and succeeded in obtaining an Act of Parliament authorising the construction of the Royal Canal of Ireland from Dublin to the Shannon near Longford.

The works were commenced, but unfortunately they were carried out so badly that matters came to an utter standstill. Rennie was then called in and, after overcoming great difficulties caused by the mistakes of the original constructors, he successfully completed the waterway. The shoemaker obtained his revenge by diverting traffic from the Grand Canal, but at the cost of heavy financial loss to many individuals and the almost entire loss of his own fortune.

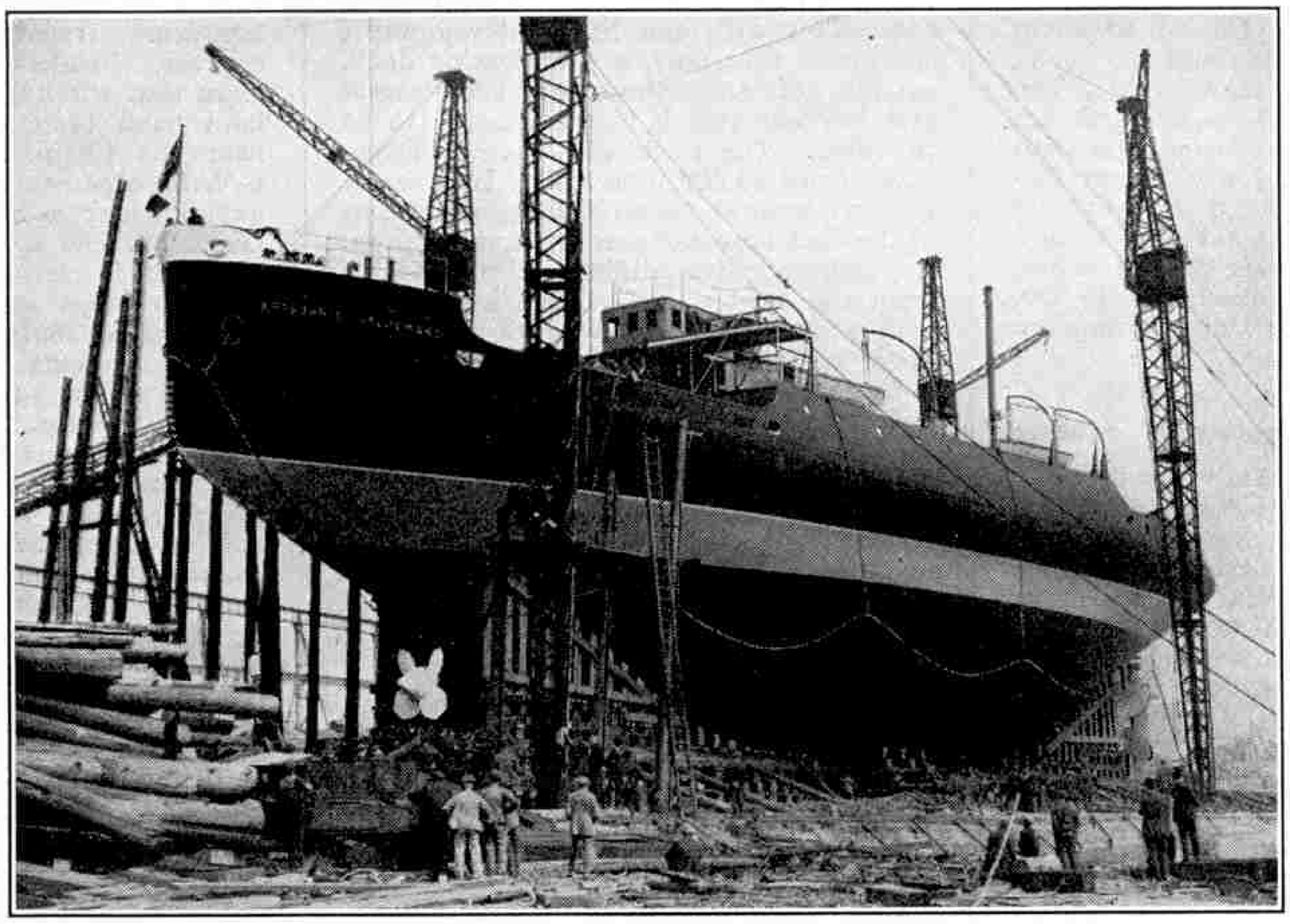
To Break the Ice at Riga

Powerful New Ship Now Being Built for Latvia

AN ice-breaker of a novel and particularly interesting type is being built at Dalmuir by Messrs. Wm. Beardmore & Co. Ltd., for the Government of Latvia. The vessel, which is named "*Krisjanis Valdemars*," is intended for ice-breaking service in the Gulf of Riga. Her principal dimensions are as follows :— Length on water-line 185 ft., Breadth 54 ft., Depth moulded to upper deck 28 ft. 6 in., Normal draught 22 ft., Normal displacement (about) 2,800 tons.

Specially Designed Stem

The "*Krisjanis Valdemars*" has a specially-designed stem with considerable rake under the waterline. Her stern is of the cruiser type, both stem and stern post being of cast steel reinforced as necessary for ice-breaking purposes.



The "*Krisjanis Valdemars*" on the Stocks at Dalmuir

The framing, which is on the deep-frame principle, is exceptionally strong, the spacing of the frames being 18 in. apart amidships, and only 12 in. apart at the ends. The shell plating is also much in excess of the usual requirements, while the ice belt from about 6 ft. above the water line to about 9 ft. below is 1 in. in thickness, both fore and aft, the end plating down to the keel line being practically of the same thickness.

In addition to heavy, closely-spaced watertight bulkheads, there are, on each side of the vessel for about three-quarters of her length amidships, longitudinal watertight bulkheads, forming coal bunkers and water ballast tanks. By rapidly transferring water from the end tanks forward to the end tanks aft, or vice versa, the vessel may be quickly trimmed either way. Similarly, by transferring water from the tanks on one side to the tanks on the other side the vessel may be quickly heeled. By this means she is able to free herself in the event of becoming locked in ice.

Towing Arrangements

Special arrangements are made for taking a vessel in tow. A recess is provided in the stern into which the stem of the following vessel may be drawn and held in that position by means of a towing winch of exceptional power fitted on top of the after deckhouse.

An electrically-driven submersible salvage pump with a capacity of about 200 tons per hour is provided, with arrangements for transferring it to a vessel in tow or alongside so as to render effective assistance in case of damage.

Novel Forward Propeller

The vessel is provided with two sets of triple expansion engines, one for driving the after propeller and one for the forward propeller. Steam is supplied by four boilers working under forced draught, and smoke-box superheaters are fitted to provide a moderate amount of superheat.

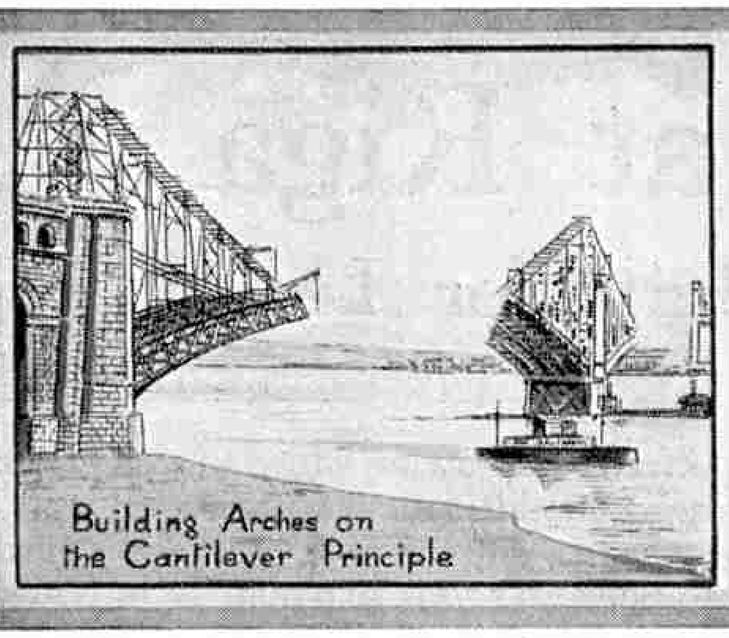
The principal functions of the after engine, which is capable of developing about 4000 i.h.p., are to propel and manœuvre the vessel. The forward engine, which is used to drive the forward propeller and to assist in the propulsion of the vessel, is capable of developing about 1,500 i.h.p. It is anticipated that these two engines working together will give the vessel a normal speed of about $14\frac{1}{2}$ knots.

The forward propeller is fitted primarily to assist in ice-breaking. When the stem of the vessel is on the ice the propeller acts as a suction pump and sucks the water away from under the ice. The support of the ice is thus withdrawn, and the weight of the vessel, together with the pressure of the water ballast transferred forward, will break down the ice and enable the vessel to forge ahead, thus clearing and keeping open a passage for other ships navigating those waters.

Electric Light Throughout

A very complete equipment of auxiliary machinery is provided, including two large centrifugal pumps for transferring water ballast from one set of tanks to another. Electric light is fitted throughout and the vessel has also a wireless installation and a powerful searchlight.

It is hoped that the new ice-breaker will render the port of Riga navigable at all seasons.



Engineering News of the Month

World's Production of Aluminium

The total world's production of bauxite in 1923 was estimated at 1,146,777 metric tons. Of this total the United Kingdom produced about 4,000 tons and the whole British Empire about 112,605 tons. The largest producer was the United States with 531,053 tons, France being next with 314,330 tons. The total world's production of aluminium in 1923 was 183,892 metric tons. Of this total the United States produced 97,000 tons, Canada 16,500, Germany 16,100, Switzerland 15,000, France 12,000, and the United Kingdom 8,500.

* * * *

Port of London Improvement Scheme

The Port of London Authority recently announced a big improvement scheme for the India and Millwall Docks. This involves the construction of a new entrance to the South-West India Dock, 500 ft. in length and 80 ft. in width by 35 ft. in depth at Trinity high water. Passages will be constructed to enable the largest vessels, capable of navigating so far up the river, to proceed to any part of this system of docks, comprising a water area of over 127 acres.

* * * *

New Hudson Tunnel

Great public interest was aroused in a model of the vehicular tunnel now being constructed under the Hudson River, exhibited at the National Automobile Show in New York the other day. This great engineering feat will be completed some time next year, and is expected greatly to improve traffic conditions between the States of New York and New Jersey, the popularity of the resorts in the latter State having brought motor-car traffic far beyond the capacity of the existing ferry service.

There will be two tunnels, one for eastbound and one for westbound traffic. Each will be 29 ft. 6 in. in width, and 9,250 ft. in length. The roadways will be 20 ft. in width, with an overhead clearance of 13 ft. 6 in. The ventilating system, which consists of air ducts at the top and bottom of each tunnel, will take up the remainder of the space.

* * * *

Empire's Largest Clock

The clock in the tower of the Singer Buildings at Clydebank has at last been converted to electrical working. This clock is the largest in the British Empire, having four dials, each 26 ft. in diameter, which is 6 ft. more than the famous Liver Building clock in Liverpool, and 8 ft. 6 in. bigger than "Big Ben."

Floating Dock for Singapore

In addition to the large graving dock that is to be constructed at Singapore in connection with the Naval development scheme at that port, a new floating dock, capable of accommodating the largest and heaviest vessels in the fleet, is to be provided. The dock will have a lifting capacity of 50,000 tons and it is probable that its general design will resemble that of the dock now stationed at Southampton. To overcome the difficulties inseparable from the towing of so huge a structure over a distance of 8,000 miles across the open ocean, it is anticipated that the dock will be shipped in parts to Singapore and assembled there, but so far no definite decision has been made upon this point. The cost of the new dock is estimated unofficially at £1,000,000 and the placing of the contract will give a useful fillip to the steel trade, as one of the conditions of the contract will be that only British steel is to be used.

* * * *

New Union-Castle Liner

The new Union-Castle liner "*Llandovery Castle*" is now on her maiden voyage from London for South and East Africa. Her principal dimensions are :—Length 487 ft., breadth 61 ft. 6 in. and depth 42 ft. 6 in. with a gross tonnage of 10,609. She is constructed of steel throughout and has three complete steel decks—a lower deck, promenade deck, and boat deck. The double bottom extends the whole length of the ship, and eight watertight bulkheads are fitted to the shade deck. In order to give maximum security against accidents, all bulkhead doors below the water line are electrically controlled from the bridge.

* * * *

Rugby Wireless Station

The Western Electric Company have recently completed the wireless telephony station at Rugby, which, when proved satisfactory, is to be used for telephonic communication with the United States.

The Company effected communication between America and this country some two years ago, and tests appeared to show that with their single-side band system, continual communication could be maintained between both countries.

An experimental test of the new station was carried out during the first week in March and extremely promising results were obtained. Conversations took place between the G.P.O. in London and the New York Headquarters of the American Telegraph and Telephone Company, and in our next issue we hope to be in a position to give fuller details.

Sea to Home by Telephone

In a railway note this month we mention experiments in the receiving of broadcast transmission on a G.W.R. express. Readers will be interested to learn that wireless talks between ship and land have been successfully carried out near the Channel Islands, between the G.W.R. steamship "*Reindeer*" and an experimenter in a house in the island of Guernsey. As a result of these experiments it is claimed that communication between ships at sea and a telephone exchange on shore is a proved possibility, messages having been clearly exchanged over a radius of from 10 to 70 miles.

The inventor of the apparatus, Mr. D. V. S. Shannon, claims that the advantages of his system of wireless telephony are that the apparatus is portable and requires neither aerial nor earth connection; transmitting and receiving sets may be combined in one small case if desired; no re-radiation takes place and, if other circuits are in close proximity, no interference is experienced.

All these tests were made with the remarkably small power of from 5 to 7 watts input, using dry batteries, and the use of the apparatus enabled the ordinary land telephone to be picked up and conversation carried on between a telephone subscriber and friends on board a steamer. The set may be operated on very low wavelengths and, owing to its great selectivity, a considerable number of stations can be accommodated on a very narrow wave band.

* * * *

A Remarkable Ship Repair

The steamship "*City of Singapore*" one of the Ellerman-Hall Line steamers, has just taken her place with the fleet after an interval of 20 months. In April 1924 an explosion and subsequent fire in her engine room occurred at Adelaide and as a consequence the vessel was seriously damaged, her engines being practically destroyed. It appeared very doubtful if she could be saved, but eventually she was salved and temporarily patched up.

A little more than a year after her accident the "*City of Singapore*" left Adelaide en route for Rotterdam, under the escort of a Dutch tug, and accomplished the journey of 13,000 miles in 4½ months, nearly two months longer than was anticipated. On her arrival, work on her was at once begun by the Rotterdam Dry Dock Company, and in order to carry out the extensive repairs that were required it was necessary practically to cut the ship in two.

British Wireless Triumph

In these columns from time to time we have commented upon the progress made at the great new Post Office wireless station at Rugby. Our readers will be interested to learn that a new service for the despatch from that station of wireless messages to ships at sea, all over the world, has just been inaugurated. In order to achieve this, the transmission has been centralised in the Central Telegraph Office, London. All messages are sent at midnight and noon, the operator being provided with a loud speaker by means of which he is able to know whether the transmission from Rugby is satisfactory. Owing to the great power required to transmit messages over such huge distances it will not be possible to obtain acknowledgment of the receipt of the messages, but nevertheless the Post Office authorities are confident that they can attain the maximum of efficiency.

An interesting point in connection with this transmission is that the private messages sent out at 12 midday will be repeated at midnight and those issued at midnight will be transmitted at midday, thus overcoming, as far as possible, any risk of a message failing to reach its destination through local or general atmospheric disturbances. The wavelength upon which this service is being worked is 18,700 metres, and the rate of transmission is fixed at a speed at which any properly trained operator can receive, perforated tape being used in order to ensure perfect formation of each signal issued.

It is hoped to commence a new night and day service to Canada and South Africa on the first of next month, and to Australia and India about three months later, this new service being worked on the "beam" system.

* * * *

Mass Production of Motor Cars

The production of motor cars in America in 1924 was 3,240,000, and in replacements alone there were 2,000,000 cars made each year. The American manufacturers co-operate with the Chambers of Commerce and the transport authorities, and their methods of production are amazingly advanced. English cars generally are at a discount in America and Canada, where there are few cars of so small a horse-power as twelve.

* * * *

Steel Frame Building without Rivets

A two-storey steel frame building, measuring 100 ft. by 150 ft., has been built at Cantan, Ohio, without the use of a single riveted joint. The structure has been put together entirely by means of electric arc welding, resulting in a saving in cost of nearly 23 per cent.

Pink Concrete Streets

The Malden and Coombe Urban District Council are constructing new streets in concrete, and have just completed one with a pink surface, the object being to harmonise the streets with the pavement stones, which are of a reddish colour.

Cape to Cairo by Motor Car

For the first time the journey from Cape Town to Cairo has been covered by motor car. The expedition that accomplished this feat was British, being under the command of Major Court Treatt. The cars used were Crossleys and the whole of the equipment was made in Great Britain. The cars came through without mishap, a wonderful tribute to the all-round reliability of British products.

Owing to very heavy rains in many places, which reduced the country to almost impenetrable swamps, the journey took sixteen months instead of the originally estimated period of six. The object of the expedition was mainly to investigate the possibilities of a great central highway, and to obtain scientific and other information concerning this hitherto unblazed trail. Cinema and photographic records were made.

There had been two previous attempts to make the journey, one in 1909 having to be abandoned owing to its leader being severely mauled by a leopard, while in 1913 another British party was compelled to postpone the attempt owing to sickness and the outbreak of war.

Mrs. Court Treatt, who accompanied her husband throughout the trip, was the first white woman seen in many parts of the Sudan.

* * *

First Rotor Pleasure Yacht



Courtesy] ["*The Motor Boat*"

Our readers will remember that we fully described the Flettner rotor ship in our January issue, 1925. The Flettner principle has now been applied with some success to yachts, as our illustration shows.

New Manchester Telephone Exchange

The contract for the erection of a new telephone exchange at Manchester has been placed by H.M. Office of Works. Among the material required for the construction will be 4,000 tons of steel, and the building will comprise ten floors with a capacity for a staff of 1,500 and a total of 30,000 telephone lines. This new exchange will take three years to build and is being put in hand now in view of the projected change from the manual to the automatic system.

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Rapid Cargo Handling

The Mersey-side dockers are noted for the expedition with which they can handle cargoes when the situation calls for extremely rapid work.

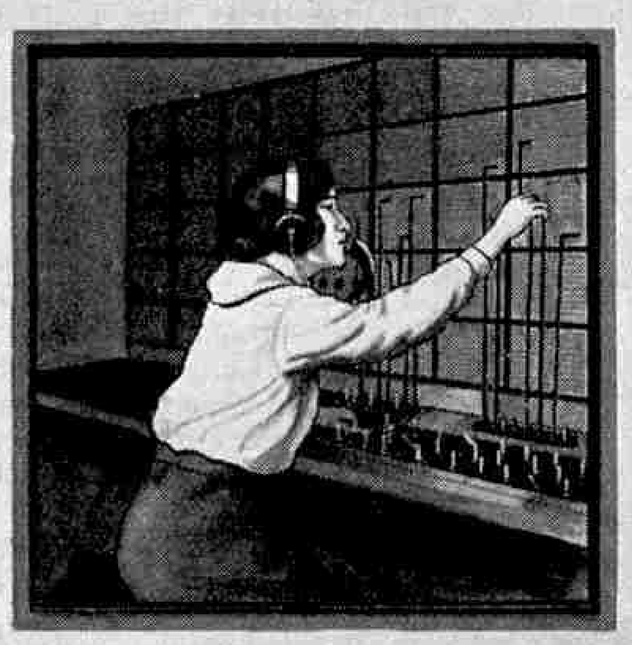
The steamer "*Trinacria*," carrying 2,840 tons of phosphate rock, was completely unloaded in twelve working hours at the Birkenhead docks. In these days of rivalry between ports, it is interesting to note that Birkenhead is still pre-eminent in the rapid discharge of berth cargoes, a speed of 3,000 tons in twenty-four hours being the ordinary rate of discharge with hydraulic grabs.

A Fine Towing Feat

During the terrific gales that raged in the North Atlantic in the latter days of January and early days of February, a remarkable towing feat was accomplished. The Pacific Steam Navigation Company's liner "*Magellan*," encountered the steamer "*Renaico*" and a tugboat in distress during a gale near Valparaiso. The "*Renaico*" was bound for Iquique in charge of the tug, but owing to the heavy gale the tug had lost control of her.

In response to urgent signals the "*Magellan*" hove to windward of the unmanageable vessels, and by good seamanship succeeded in attaching a towing hawser. Then commenced a heavy fight against wind and sea, for it was necessary for the "*Magellan*" to sail directly into the teeth of the gale in order to reach the nearest port. During the fight, the hawser snapped but communication was soon re-established, and after a strenuous twelve hours, the Pacific Company's vessel succeeded in bringing her two charges into Valparaiso.

This is one of many similar determined efforts performed in the face of danger and unfortunately, often accompanied by loss of life.



Electricity

XXV. AUTOMATIC TELEPHONY

WE have already described in this series how a manual telephone exchange is operated in order to secure the connection of any two subscribers who wish to speak to one another. This system is employed at the present time in thousands of exchanges throughout the world. Although it entails the employment of a fairly large staff of operators, it represents an enormous advance on the system used in the early days of telephony, particularly in the employment of various automatic devices to assist and speed up the service.

The First Automatic Exchange

Rapidly as the telephone system advanced, telephone engineers were not satisfied, for they had visions of automatic systems in which the exchanges would require no operators, subscribers making their own connections by means of simple switching arrangements in their own homes.

For a long time such a development appeared impossible, but on 10th March 1891, Mr. Strowger entered in the United States Patent Office a patent for an automatic exchange, and the vision then became a reality. It is true that this first system required five connecting wires between each subscriber and the exchange, but eventually these were reduced to two, and so far as the subscribers' wire plant was concerned it became as economical as the Manual system.

Since that time many successful systems of automatic telephony have been invented and installed in exchanges of all sizes. Each of these systems has its own particular advantages and disadvantages but it safely may be said that the Strowger system is the most popular at the present day. After exhaustive tests a further development of this system has been adopted by the engineers of the British Post Office for the complex network of automatic exchanges now in course of erection to serve the vast area of London, as will be described next month.

The Strowger System

Over one-and-a-half million Strowger automatic telephones are in operation throughout the world, the largest network being, we believe, that at Los Angeles, California, with 90,000 lines. Some of the most important exchanges on this system in Great Britain are at Accrington, Newport (Mon.), Chepstow, Portsmouth, Paisley, Blackburn, Leeds and York, all of which were erected for the British Post Office by the Automatic Telephone Manufacturing Co. Ltd. of Liverpool. Further exchanges proposed or in course of erection are those constituting the London network, comprising nearly 160,000 lines, Bath, Birmingham, Brighton, Bristol, Edinburgh, Leicester, Liverpool, Manchester, Newcastle, Nottingham, Sheffield, Southport, and thirty-three other areas.

We intend to confine our description of automatic exchanges to the Strowger system as being the most important, and we are indebted to Automatic Telephone Manufacturing Co. Ltd., pioneers and principal manufacturers of the Strowger system in this country, for the illustrations to this article and also for much useful information.

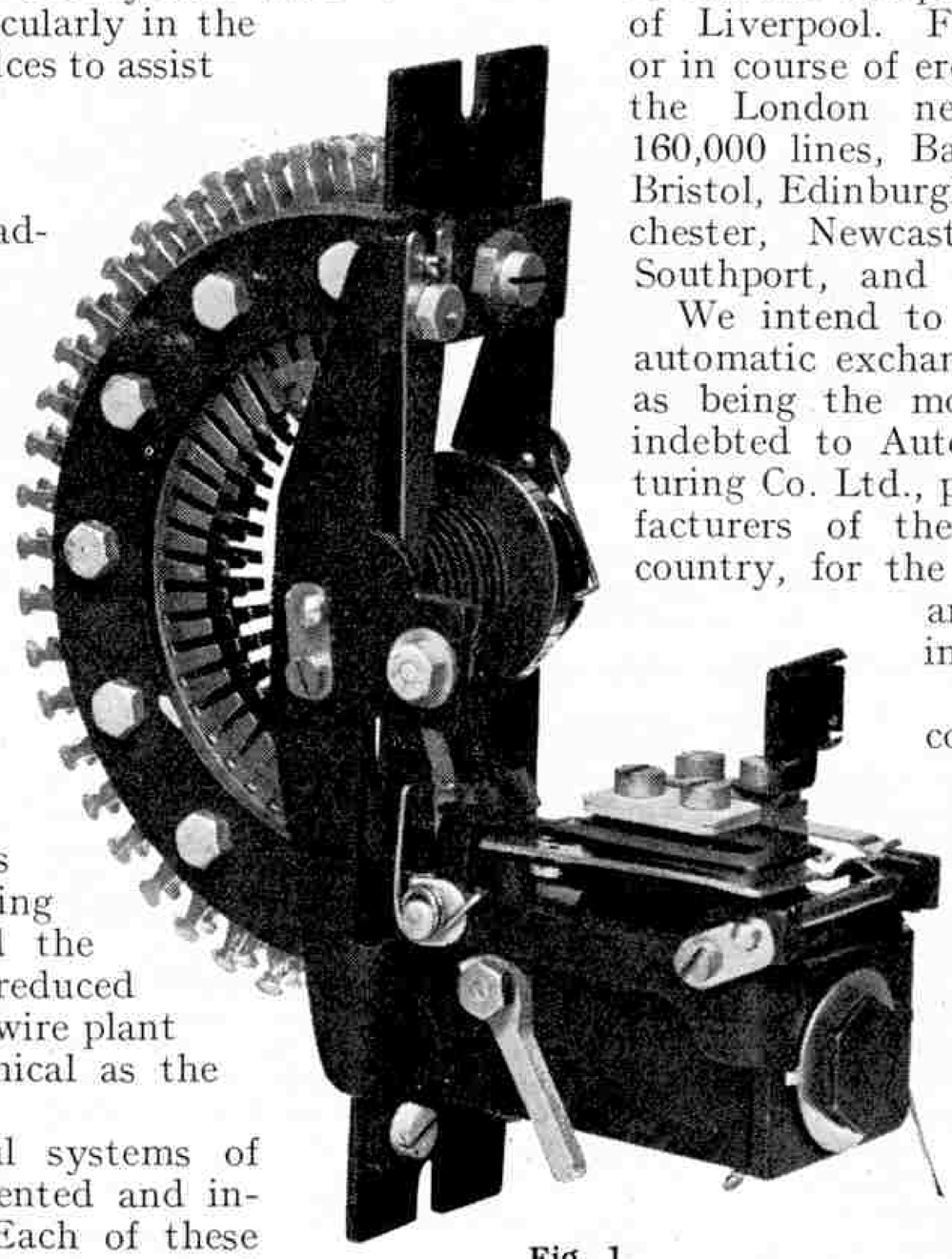


Fig. 1

The Strowger system accomplishes the automatic switching by means of sluggish and quick-acting relays respectively, the movements of which are controlled by various electro-mechanisms. Since the circuit connections are very complicated we do not intend to describe them here but will confine our attention to tracing the sequence of events that takes place in making a call through a Strowger automatic exchange.

The apparatus consists of a number of easily replaceable units and the exchange is capable of being readily extended by the installation of additional units. The subscriber himself transmits the required number to the exchange electrically, and this has the advantage over a manual exchange that no errors due to mistaken pronunciation of figures or words are possible. The subscriber has only himself to blame if he finds himself connected to the wrong number!

The System Explained

In Fig. 3 we illustrate a wall type of telephone provided with the automatic dial, with a subscriber in the act of making a call. It will be seen that the apparatus consists of the usual telephone outfit for a central battery circuit (see the "*M.M.*" for February, p. 91) together with a dial or calling device. The latter consists of a fixed circular white disc bearing the numbers 1 to 9 and 0 arranged in a circle, over which is mounted on a central axis a black circular disc pierced with ten holes which, when this disc is in its normal position, come over the numbers on the fixed disc below.

To call a number, say 7014, the subscriber first lifts his receiver from its hook and then inserts his finger in the hole above the figure "7" and rotates the disc in a clockwise direction until his finger reaches the finger-stop in the right-hand lower corner. On removing his finger, a spring, wound up by the action of dialling, returns the disc to its normal position, during which movement a series of electrical impulses is sent out over the line wires to the exchange.

The subscriber next inserts his finger in hole "0" and brings the disc round as before, following this by dialling "1" and "4." Immediately he has dialled the "4" the bell on the premises of subscriber 7014 rings. If the wanted subscriber is already engaged, the caller hears a distinctive buzz in his receiver. If at any time in the course of making a call the wrong number should be dialled, the subscriber merely has to press the receiver hook and begin the process again.

To terminate a call the subscribers replace their receivers. There is no hand generator for ringing-up or ringing-off since this is a central battery system, power being obtained from the exchange over the subscriber's line.

At the Exchange

As soon as a subscriber removes his receiver from its hook, current flows through the line circuit and the action of the dial is to interrupt this current a number of times corresponding to the number dialled, this action taking place when the dial is returned to normal by the spring. Thus, when the dial is returning after being pulled round for "7," the line current is interrupted seven times.

When the receiver is removed from its hook, in addition to causing current to flow through the local telephone circuit, a relay switch is operated at the exchange which prevents anyone calling the subscriber until he replaces his receiver, and further, a rotary line switch (Fig. 1) is brought into action. Each line is provided with an individual rotary line switch for its exclusive use, and this serves the purpose of reducing by over ten times the amount of other apparatus necessary at the exchange.

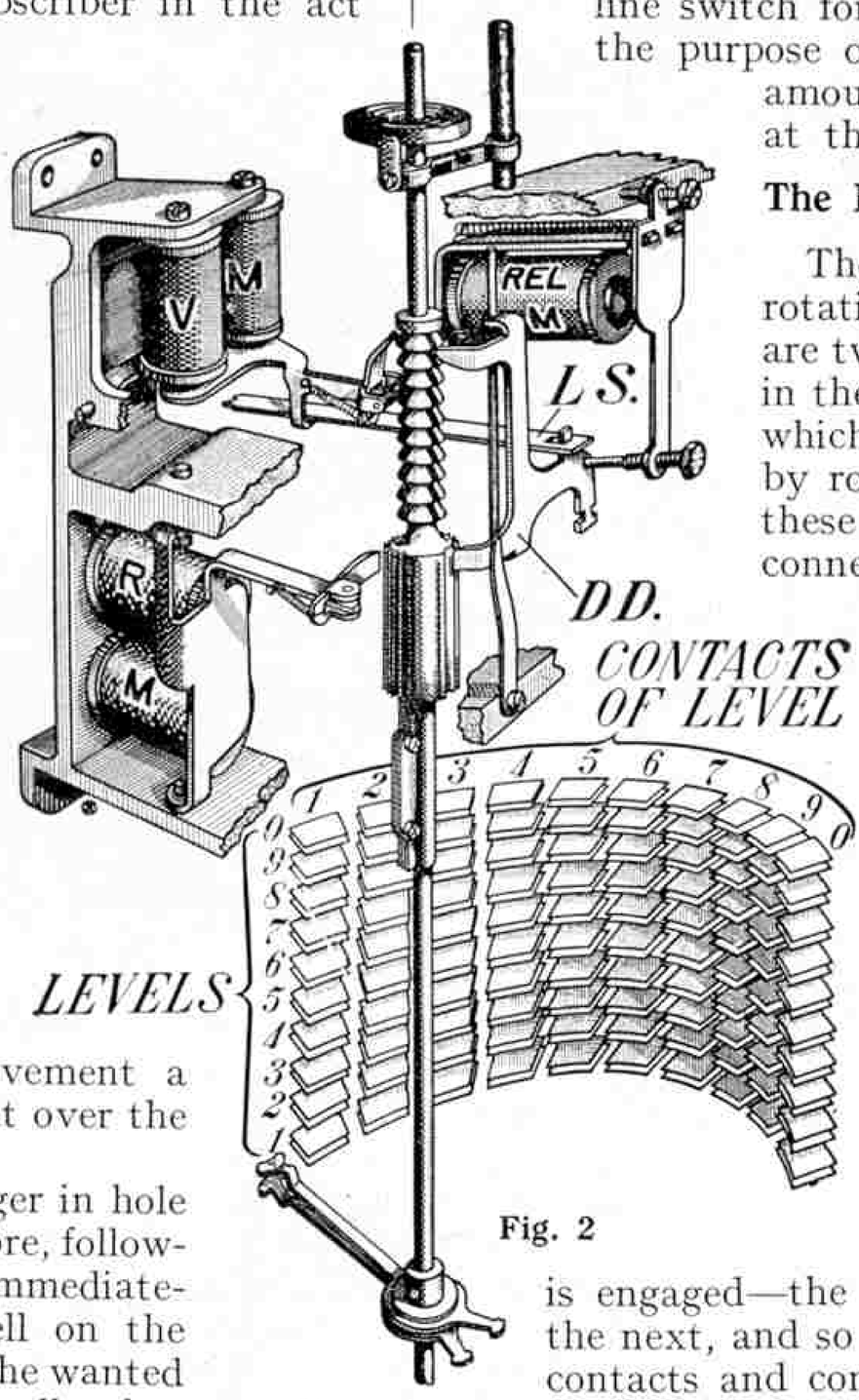


Fig. 2

The Rotary Line Switch

The line wires are connected to the rotating portion of the switch. There are twenty-five sets of contacts arranged in the form of a semi-circle, with any of which the line wires may be connected by rotating the moving part. Each of these twenty-five sets of contacts is connected to the corresponding sets of ninety-nine other rotary line switches belonging to ninety-nine other subscribers. Further, each of the twenty-five sets is connected to another type of switch termed a "first group selector."

When the receiver is removed from its hook on the subscriber's premises the rotary line switch comes into action and the "wipers" meet the first set of contacts. If, however, one of the ninety-nine other switches belonging to the ninety-nine other subscribers is already using the first set—that is, if the first set is engaged—the wipers automatically move on to the next, and so on, until they find a vacant set of contacts and consequently a corresponding vacant first group selector. This process is technically known as "searching for trunks."

The First Group Selector

When a disengaged trunk is found, the subscriber is connected through it with a first group selector, the whole of this action being accomplished in the short interval of time between the lifting of the receiver and the dialling of the first digit.

The function of the first group selector is to respond to the first digit dialled, that is, the "thousands" digit, and to connect the subscriber's apparatus via another trunk to a "second group selector" that can deal with the second or "hundreds" digit.

A skeleton outline drawing of the group selector is shown in Fig. 2. It consists of a bank of one hundred sets of fixed contacts arranged in groups of ten in a semi-circle on each of ten levels, as shown in the figure. An upright shaft capable of both vertical and rotating movements carries a pair of contact wipers as shown, and by suitably combining the vertical and



Fig. 3

rotary movements of the upright shaft these wipers may be brought into contact with any one of the hundred sets of contacts.

The twenty-five trunks from the rotary line switch terminate in the wipers of twenty-five first group selectors. The normal position of the wipers is as shown in the diagram, not making contact at all, but when the subscriber whose call we are tracing dials the first digit "7," the shaft carrying the wipers is raised seven successive times by the vertical lifting magnet VM. This brings the wipers opposite to the seventh level of the bank of contacts and the rotating magnet RM immediately moves the wipers into contact with the first set in this level.

Each of the sets of contacts in this level is connected by further trunks to second group selectors, whose duty it is to deal with calls to subscribers in the seven-thousands group. This rotary action is similar to that of the rotary line switch already described and serves the same object of saving apparatus, the wipers moving on automatically step by step until a vacant trunk belonging to a vacant second group selector in the seven-thousands is found.

Before passing on to the second group selector it might be mentioned that at the termination of the call the release magnet Rel. M. comes into action and allows the wipers to be returned to their normal position ready for another call.

The Second and Final Selectors

The operation of the second group selector, whose function it is to deal with the hundreds digit of, in this case, the seven-thousand group of lines, is exactly the same as that of the first group selector. In the present case, when the number 7014 is being dialled, the wipers will be raised ten times to the "0" level, when they will rotate as before until they come into connection with a disengaged trunk on this level, thus connecting the subscriber's apparatus to the final selector. This latter also is similar in construction to the first group selector, but instead of dealing with only one dialled digit it responds to the dialling of both the tens and the units digits.

When the tens digit (in this case "1") is dialled, the wipers of the final selector will be raised to the first level and then, following the dialling of the units digit, "4," they will be stepped round four times, so that they come into contact with the fourth set on the first level.

This set of contacts is connected to the line terminals of subscriber 7014 and if his telephone is disengaged the apparatus will immediately connect an automatic ringer to his line. This ring will be heard faintly in his receiver by the originator of the call, so that he is assured that the connection is complete and the apparatus in working order. The ringing apparatus continues to operate intermittently until either the called subscriber lifts his receiver to answer, or the originator replaces his receiver, having failed to obtain an answer. The automatic meter to record the call does not operate until the *called* subscriber lifts his receiver, so that there is no fear of an incomplete call being charged for.

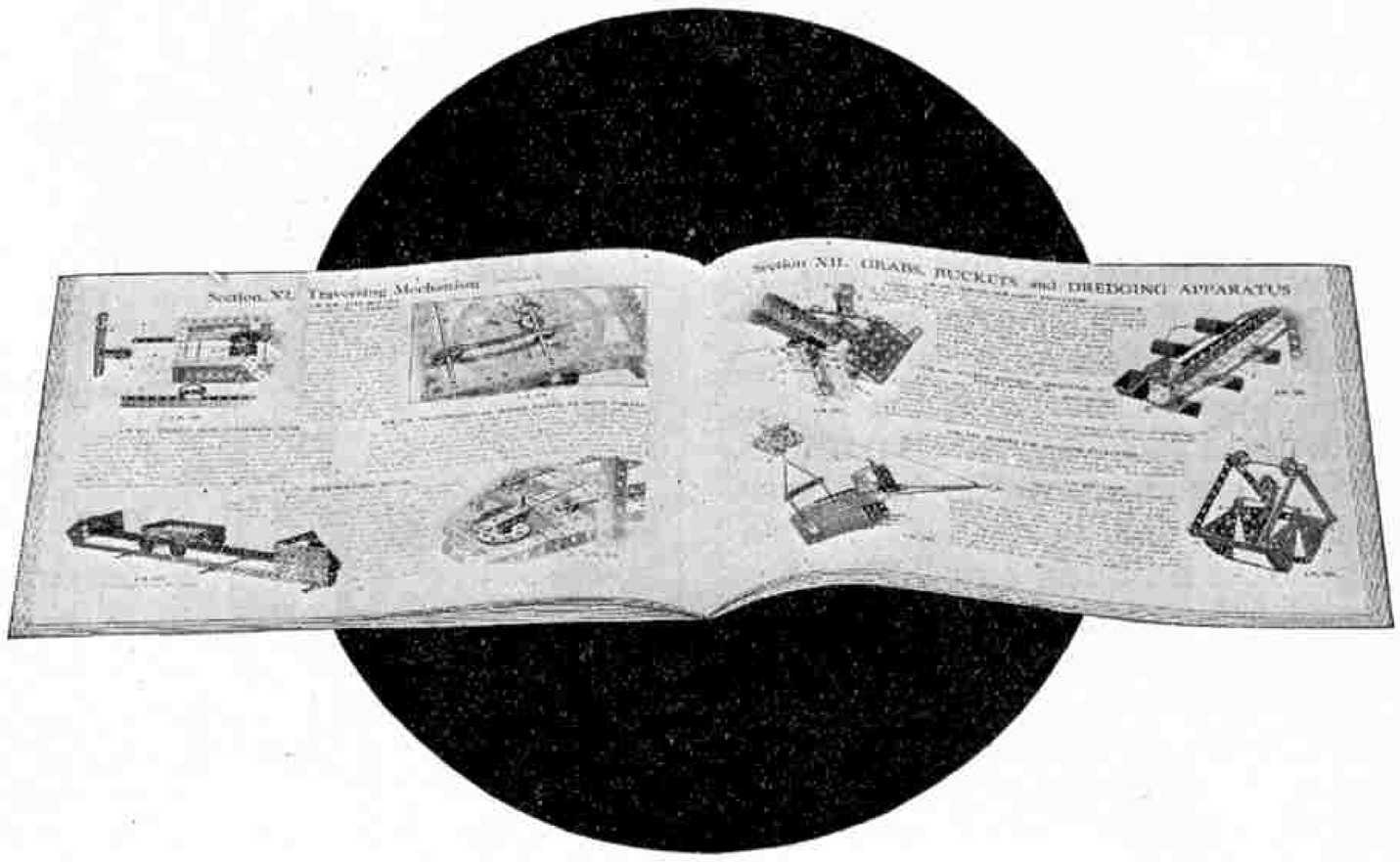
Should the wanted subscriber's telephone be engaged, the caller will hear the distinctive "busy" buzz in his receiver, as already described. He will then replace his receiver and re-dial when he thinks a sufficient interval has elapsed for the required number to have become disengaged.

The rotary line switch and the first, second and final selectors all remain in their positions and are reserved for the exclusive use of the conversation until the call is terminated by the replacement of the receivers, which automatically releases the whole series and leaves them free to deal with other calls.

NEXT MONTH:—

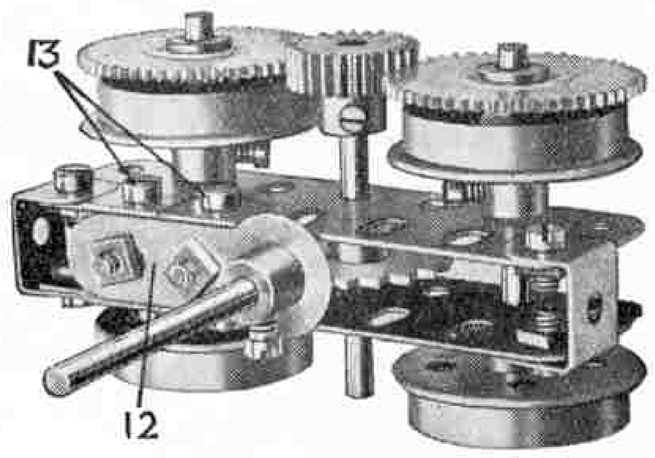
AUTOMATIC EXCHANGES IN LARGE AREAS

"Meccano Standard Mechanisms"



There are a number of Meccano movements that have to a certain extent become standardised; that is to say, they may be applied to more than one model—in most cases without any alteration, but in some few instances with only slight alterations to the original movement. These have been collected and classified, and a selection has been published in each issue of the "*M.M.*" for the last few months as "Meccano Standard Mechanisms."

The entire collection, including the movements already published in these pages and many others in addition, may now be obtained in the form of a new Manual entitled "Meccano Standard Mechanisms." This publication consists of 48 pages, $9\frac{3}{4}'' \times 6\frac{1}{2}''$, and contains over 140 illustrations in half-tone. The various devices have been arranged so that immediate reference may be made to any particular motion that it is desired to incorporate in a model, and the book should be of special value in assisting inventive boys to embody correct engineering principles in their new structures. The clear and detailed manner in which the various mechanisms are described will be appreciated on examining the specimen illustration reproduced on this page. No keen Meccano boy will consider his equipment complete without a copy of "Meccano Standard Mechanisms."



S.M. 165a, Power-driven Bogie (Traversing Mechanism)

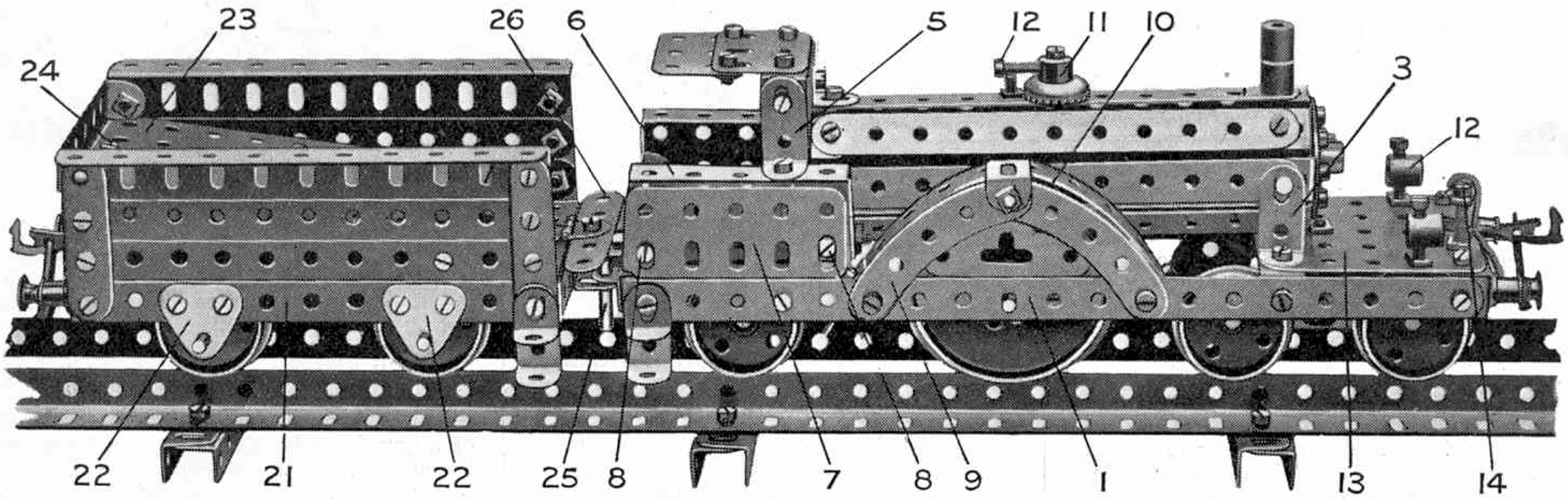
The book is divided into thirteen principle sections, as follows:—

I. Gear Ratios: Methods of Speed Reduction and Acceleration.
II. Belt and Rope Mechanism.
III. Pulleys and Pulley Blocks.
IV. Levers.
V. Clutches, Reversing and Drive-Changing Mechanism.
VI. Brakes and Retarding Appliances.
VII. Roller and Ball Bearings, etc.
VIII. Steering Gear.
IX. Screw Mechanism.
X. Overhead Trolleys and Trucks for Gantries, etc.
XI. Traversing Mechanism.
XII. Grabs, Buckets and Dredging Apparatus.
XIII. Miscellaneous Appliances.

The price of "Meccano Standard Mechanisms" is 1/1½ post free. Overseas, price 1/7½ post free. It may be obtained from any Meccano dealer, from our Overseas agents (addresses on page 288), or direct from Meccano Ltd., Binns Road, Liverpool.

A NEW MECCANO MODEL

4-2-2 LOCOMOTIVE AND TENDER



WE illustrate a Meccano model of an old-style Midland "single-wheeler" locomotive, constructed from drawings submitted by Keith W. Cameron, of Wallasey, Cheshire, in the recent "Locomotive" Competition. This interesting model gained an award for its designer, and we feel sure that our readers will agree with the judges' opinion that its simplicity and gracefulness of line deserves very high praise indeed. In view of the fact that its construction follows sound and instructive principles, we decided to publish details of its design, in order that all Meccano boys who wish may build it, and so judge of its merits for themselves.

The engine frame is built up from two 9½" Strips 1 joined at the points 2 (Fig. A) by 2½" × ½" Double Angle Strips, and further strengthened at each end by 2½" Angle Girders. The boiler is composed of seven 5½" Strips bolted at either end to a Bush Wheel by means of Angle Brackets. It is supported at the smoke-stack end by 1" × ½" Angle Brackets 3, while an Angle Bracket secured to the lowest hole of the rear Bush Wheel is bolted at 4 (Fig. A) to the floor of the cab.

The cab roof consists of two 1½" Flat Girders joined together and bolted by Angle Brackets to 1" × ½" Brackets 5. 2½" × 1" Double Angle Strips 6 and Flat Girders 7 bolted together by Angle Brackets at 8 form the sides, which, in turn, are bolted by Angle Brackets to the footplate.

The wheel covers for the main drivers are each constructed from two 2½" Curved Strips 9 and a 5½" Strip 10 bent to the same curvature. A Corner Bracket is secured in the centre as shown.

A safety valve in the centre of the boiler consists of a ¾" Contrate Wheel 11, secured by means of a ¾" Bolt and carrying a further ½" Bolt 12. The smoke-stack is composed of two Threaded Bosses mounted on the shank of a ¾" Bolt passing through the top strip of the boiler. Two lamps are carried on the front of the engine-frame and consist of Threaded Bosses 12 mounted on the upturned shanks of ½" Bolts secured in the 2½" × 2½" Flat Plate 13, and gripped in position by 7/32" Bolts inserted in the tops of the Bosses.

A piece of Spring Cord, secured to a ¾" Bolt 14, represents the front vacuum brake pipe connection.

It will be noticed from Fig. A that the front bogie consists of two 2½" Strips 15, bolted to a Double Bracket 16. It is attached to the locomotive frame by means of a ¾" Bolt, secured by two nuts on its end to the Flat Plate 13. A small compression spring is placed on the bolt between the Double Bracket and the base plate. The rear trailing wheels 17 are mounted on a 1½" Rod passed through two Trunnions 18 bolted to the under-side of the footplate. The wheels are retained in their correct position by means of a Collar 19, spaced between two Washers.

The driving wheels are built up from Face Plates and Wheel Flanges, and are secured to a 3" Rod 20. They are spaced in the correct position in the centre of the frame by means of three Washers placed between the boss of each Face Plate and the sides 1 of the engine.

Steps are provided at the footplate end of the loco frame and on the tender. These are fashioned from a 1" × ½" and a ½" Angle Bracket bolted together.

Parts required :

2	of No. 1A	1	of No. 29	2	of No. 109
13	" " 2	131	" " 37	4	" " 111
1	" " 5	11	" " 38	3	" " 111A
4	" " 6	2	" " 46	1	" " 114
1	" " 6A	1	" " 48	4	" " 120A
2	" " 9	10	" " 48A	2	" " 121
2	" " 9D	1	" " 52	2	" " 126
1	" " 11	1	" " 53A	2	" " 133
41	" " 12	6	" " 59	2	" " 137
8	" " 12B	4	" " 64	1	piece of No. 58
3	" " 16	2	" " 72	1	spring from Buffer No. 120A
3	" " 18A	4	" " 77		
1	" " 18B	4	" " 90		
10	" " 20	2	" " 103F		
2	" " 24	3	" " 103H		

Construction of the Tender

A 5½" × 2½" Flange Plate 21 forms the base of the tender and the sides are each built up from two 5½" Strips and one 5½" Girder. The back consists of four 2½" × ½" Double Angle Strips. The wheels are carried on axles journalled in 1" Triangular Plates 22 bolted to the base plate. A 4½" × 2½" Flat Plate 23 is secured in the tender by means of an Angle Bracket bolted to the back at 24, and a 2½" × ½" Double Angle Strip at the other end of the plate.

The loco and tender are coupled together by means of a 1" Rod 25, passed through two Angle Brackets. An extension of the footplate consists of a 1½" Flat Girder and a 2½" Strip 26, bolted by means of a Hinge to the tender. Meccano Spring Buffers are fitted to both loco and tender.

If desired a Meccano Clockwork or Electric Motor may be fitted in the tender to supply the motive power, the drive being led down by any suitable gearing to the wheels. A similar arrangement of the drive will be found in the Locomotive and Tender shown in the new complete Manual (see Model No. 715).

The model may be adapted to run on Hornby rails by placing the wheels a little closer together, although this necessitates a slight revision in the design of the engine frame.

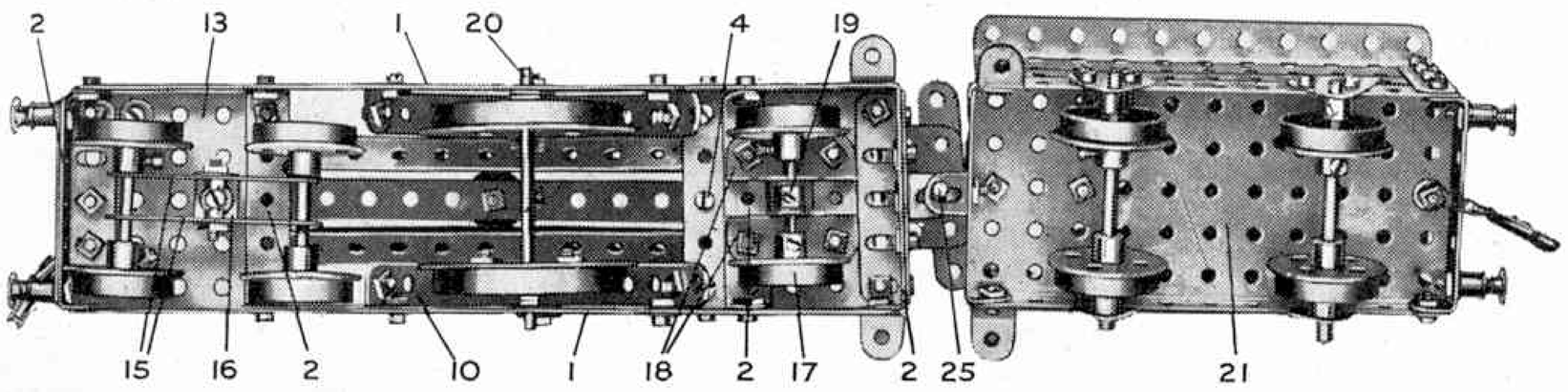
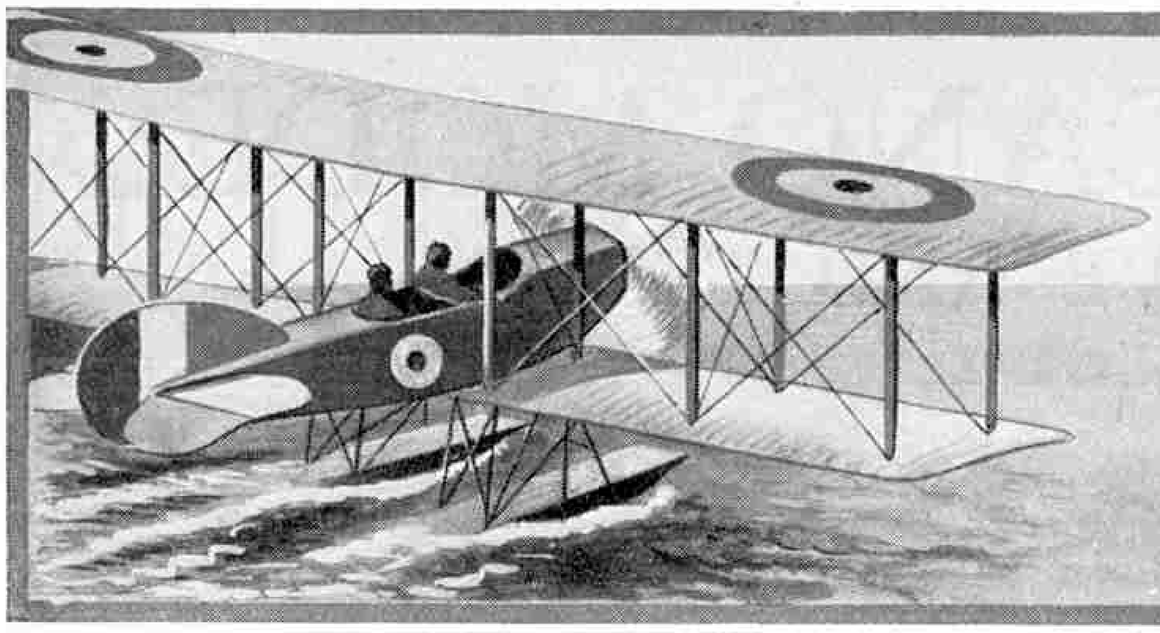


Fig. A



Air News of the Month

Aerial Surveying

The 1924/25 Report issued by the Director of Civil Aviation throws an interesting light on the extent to which aerial photographic maps have become popular. Representatives of one firm alone spent 120 hours in the air in connection with this work and the maps produced covered such widely different scenes as country estates and congested areas of towns. Such maps have proved of considerable assistance in drawing up extension progress reports on factory building, road making, etc.

* * * *

Listening-in Aloft

During recent experiments in a French air express, passengers flying between London and Paris have been able to listen to broadcast programmes while crossing the Channel. In the fore part of the machine a mechanic in charge of a valve receiving set has tuned in to one or other of the broadcasting stations and as many as twelve sets of headphones, placed alongside the passengers' arm chairs, have been used.

* * * *

Aeroplane Engine Tests

In a recent 240 hour endurance test for aeroplane engines of from 350 to 450 h.p., a Renault engine was alone in running continuously for the time prescribed. The contest was for a prize of 1,300,000 francs.

* * * *

Airship Developments

With the cancellation of further work upon R.36 and the abandonment of R.33's flight to Egypt and India, airship development in Great Britain seems doomed to slow progress for at least two or three years. Of course, considerable interest still centres around R.101, to which, it is stated, seven Beardmore high-speed heavy oil engines of 600 h.p. each are being fitted, but some time must necessarily elapse before this vessel is ready for her trials.

In the meantime the problem of the best gas for the inflation of airships occupies the attention of experts throughout the world. Helium is still regarded as the safest, but the comparative rarity of this gas makes the apparently inevitable wastage a serious matter to overcome. In Germany a system is being investigated whereby an airship is to be made to ascend and descend by heating and cooling the helium by electricity, so that it expands or contracts, thus inflating or deflating the envelope. In some American aviation circles, however, airship designers are very hopeful that the development of the heavy oil engine will make possible the safe use of hydrogen, which gives a very much greater cruising radius than helium.

* * * *

Western Australian Airways

In November last Western Australian Airways completed their 200th trip and had then flown a distance equivalent to 24 times round the world.

* * * *

South African Non-Stop Flight

The South African aviators, Major Meintjes and Lieut. Roos, recently flew a total distance of 1,200 miles in 13¼ hours without a stop. The machine was a D.H.9 equipped with a 240 h.p. Puma engine and belonging to the South African Air Force. The object of the flight, which was over a circular course starting and finishing at Pretoria, was to demonstrate that it was possible to reach any part of South Africa in one day if necessary.

* * * *

New Flying Badge

It has been announced that the King has approved a new flying badge to be worn by officers of the Royal Navy and the Royal Marines when attached to the Royal Air Force for service in the Fleet air arm. The badge consists of a silver anchor and cable of silver embroidery, surmounted by a laurel wreath of silver embroidery superimposed on the wings of an albatross in gold embroidery.

The badge will be worn by Naval officers in the centre of the left sleeve and by officers of the Royal Marines on the left fore-arm and must be worn continuously during the whole period of an officer's attachment to the flying service.

* * * *

Aerial Postage Train

In our February issue we described the experiment of releasing small aeroplanes from an airship in flight, and we now learn that the method then employed is being experimented with as a means of picking up mails while the parent ship is in flight.

To attain this object long steel ropes carrying a cross-bar are lowered from beneath the airship. The small aeroplanes, equipped with a clip somewhat resembling that used on trains for picking up mail bags, fly close enough to permit the clip to engage with the cross-bar. When the aeroplane is thus anchored, the engine is shut off and the machine hauled up to the parent airship. Experiments on these lines have been carried out very successfully with both airship and aeroplane travelling at a high speed.

New Air Service

German interests are co-operating with Imperial Airways Ltd., in the arrangements recently completed for a service of all-metal air boats carrying passengers, mail and general merchandise between Great Britain and Sweden. The machines to be used will be monoplanes designed by the German constructor Dornier and driven by Rolls-Royce engines. The journey of approximately 700 miles will be made in one day, and the service is to commence in June next, the route being from Gothenburg, down the Kattegat to Kiel, along the Kiel Canal and across the North Sea to Harwich.

* * * *

World's Air Records

The Federation Aeronautique International, the accepted authority on air records, has recently overhauled its record books. Hitherto it has been possible to create some 1,300 world's air records of varying nature, but with the object of increasing their technical, commercial and moral value, this number has been reduced to 168, all but the most important ones having been eliminated.

* * * *

The League of Aviators

An International League of Aviators, composed of aeroplane pilots drawn from Great Britain, France, Italy, Belgium and the United States, has been inaugurated in Paris under the auspices of the French Organisation of Pre-war Aviators. The association has for its main aim the preservation of peace in the air and it is anticipated that within two years the membership will be over 30,000.

* * * *

Sun Worship

The dull spell experienced towards the end of January evidently had had a very depressing effect upon a party of visitors who called at the Croydon Aerodrome on 1st February. They demanded to be taken to see the sun, and a powerful Napier D.H. machine was made ready and the party embarked. During the preparation for the flight it was ascertained from the Meteorological Office that the cloud bank at that moment did not extend upwards from the earth for more than 4,500 feet.

Up and up went the machine until it attained a height of 6,000 ft. where it emerged into brilliant sunshine. The delighted passengers insisted upon the pilot remaining aloft for some little time, and remained basking in the sun. The total bill for the flight amounted to £30, and when this was presented to them upon their arrival back upon the earth the passengers declared it to have been well worth it!

Aerial Camera Developments

We have mentioned recently the importance of aerial photography and in this connection a new aerial survey camera is of interest. This camera is automatic in action and makes 100 exposures on one spool of film without any attention, after the shutter has been set to take photographs at regular intervals of half a mile or at any other desired interval.

All the airman has to do is to pilot his machine in a straight line across country and to maintain the same altitude throughout. Upon reaching the boundary of the area under survey, the machine would be put about and flown back across the same country in a line parallel to the previous route. Throughout this time the camera will make exposures that, when developed, printed and pasted up together will form a mosaic map of the area covered. The maintainance of uniform altitude ensures a uniform scale for the photographs, which are not only accurate from a geographical survey point of view, but also include every road, landmark, building and tree.

Specially prepared films sensitive in an unusual degree to red rays are employed, and with their aid the aerial camera is able to secure perfectly defined photographs even on misty days.

* * * *

A Remarkable Fighting Machine

A two-seater fighting machine is now being constructed privately, without the supervision of the Air Ministry, by a well-known British firm of aircraft constructors. This machine will be able to climb to an altitude hitherto only attainable by a single-seater scout and will be capable of a speed of 200 miles per hour. The engine is to be one of the new type direct drive Napiers, so that the machine will be all British.

Elaborate precautions are being taken to eliminate all external projections such as bracing wires and struts, and the controls will be carried inside the wings and fuselage structures, thus making the stream line almost perfect. The weights are so grouped that the machine possesses an extraordinary degree of manœuvrability. In fight it will be able to turn, twist, and dive with such lightning rapidity that the gunner, seated immediately behind the pilot and in such a position that signals will be easily exchangeable, will be placed quickly in a position to bring his machine gun into operation.

Huge Passenger Machines

After this month the passenger services of Imperial Airways Ltd. will be operated almost entirely by multi-engined machines. The fleet will then include, in addition to the huge Vickers Vanguard, four new Handley-Page sixteen seater twin-engine machines, three twin-engine Handley-Page-Rolls-Royce machines, and two three-engined Handley-Pages.

Giant Passenger Machine

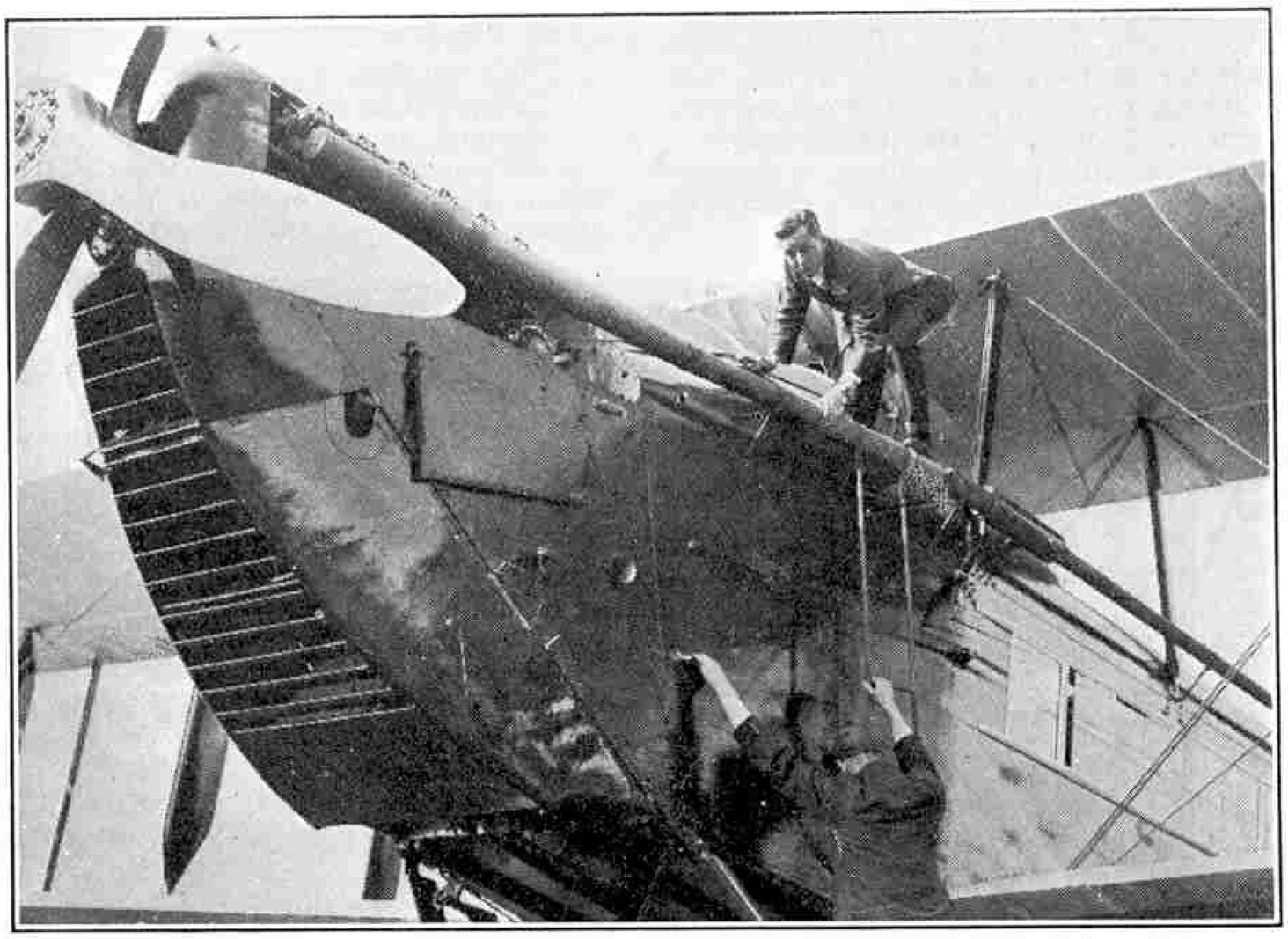


Photo courtesy [*De Haviland Aircraft Co. Ltd.*

Our photograph shows Captain H. S. Broad, test pilot, entering the cockpit of a D.H.54, the largest single-engined commercial aeroplane in the world. This is the De Haviland "Highclere," designed to carry 14 passengers in a luxuriously appointed cabin and fitted with a 650 h.p. Rolls Royce "Condor" engine

Australian Amphibians

A Supermarine Napier-Seagull, was launched at Southampton in February by Lady Cook, wife of the High Commissioner for Australia. This is the first of a batch of six Australian amphibian aeroplanes.

* * * *

New Puma Machine

Secret tests have been carried out recently with a new Puma aeroplane driven by a single Rolls-Royce engine developing more than 700 h.p. The machine is capable of flying with a full load of passengers at 100 miles an hour at an altitude approximating to four miles. At this height the machine will be practically invisible and consequently almost immune from attack by anti-aircraft guns. The speed in the rarified atmosphere existing at such an altitude is phenomenal.

Details are not yet available, but a recent decision of the Air Ministry to replace all existing wood and fabric machines by all-metal 'planes gives a very definite pointer as to the construction of this machine. The change-over to all-metal is to be completed by the end of 1928, but the replacement will only be made as the present machines become obsolete.

German Aircraft Activities

Preparations are being made by German aircraft constructors to start work on several giant machines, more powerful than any in the world, and already the designs of some huge multi-engined machines have been completed. As our readers are aware, aircraft construction in Germany is limited by clauses in the Treaty of Versailles, but it is anticipated that after Germany's admission to the League of Nations these restrictions will be relaxed.

A 28-passenger machine is to be built at the Rohrbach factory in Berlin, and the details of this machine afford a clear indication of Germany's aerial ambition. The machine is to be fitted with three engines, each of 400 h.p. These will be American Wright air-cooled radial engines, which were delivered some weeks ago at the works in Berlin. The wing span of the machine is to be 177.17 ft., and it is hoped that trial flights will take place within the next two months.

The Dornier firm are considering the details of a 3,000 h.p. passenger-carrying machine and it is probable that this will be fitted with British engines. A huge four-engined Dornier flying-boat, similar in certain constructional features to the machine in which Commandant Franco made his flight to Buenos Ayres recently, has been commissioned by the Spanish Government. This machine will have four Napier "Lion" engines giving a total of more than 1,800 h.p.

Factories building machines of German design in Copenhagen, Moscow, and elsewhere are busily engaged on aircraft for foreign governments. The Turkish Government is reported to have ordered fifty single-seater duralumin fighting aeroplanes from the Rohrbach works near Copenhagen. These aeroplanes will have a speed of 186 m.p.h.

Three-engined all-metal Junkers monoplanes for Chile and Russia are being constructed under licence by a Swedish factory.

* * * *

Relief from the Air

In consequence of reports that some of the crew were on the verge of starvation, aeroplanes carrying bully beef and biscuits were despatched to the relief of three ships locked in the ice in the Gulf of Finland. The provisions were dropped on the ice floes near the ships, several of which have been held up for some months.

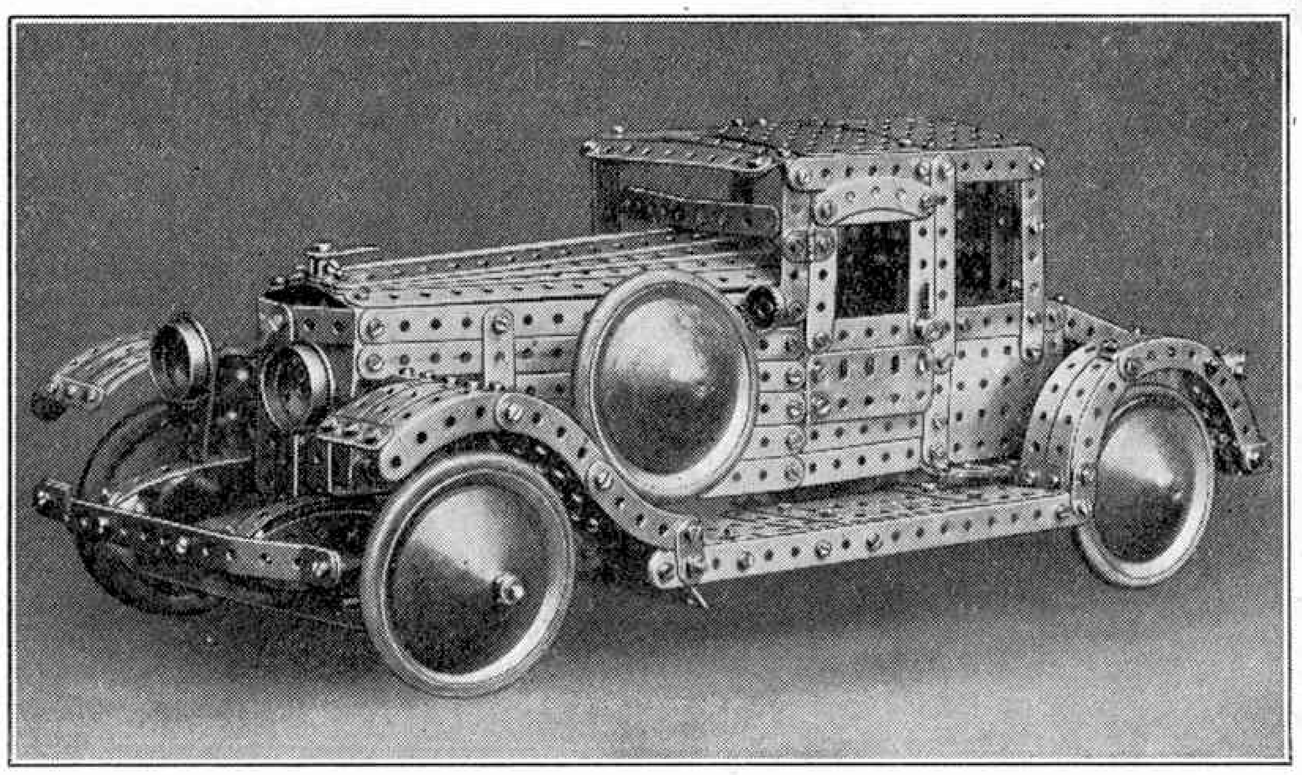
Results of
Meccano Model-Building Contests

By Frank Hornby

Motor Competition

LAST month I expressed the opinion that aeroplanes, motor-cars, etc., were rapidly increasing in popularity as subjects for Meccano models. The response to the Motor-car Model-building Competition seems to support this belief, for the number of entries received even surpasses the record set up in the Aeroplane Contest. Indeed, if the model-building competitions continue to grow at this rate it will be necessary to augment our staff of judges to a considerable extent, otherwise we shall be terribly over-worked in awarding prizes!

The selection of prize-winners in the Motor Competition proved a difficult task and it was decided to give two prizes of 10/6 each in addition to the six first announced. Also, a tie was declared for the third prize, as it was quite impossible to decide which was the better of the two entries in question. Following last month's practice I am again awarding a number of handsome Certificates of Merit to those competitors whose work closely approached prize-winning standard, while a number of complimentary copies of the "Meccano Standard Mechanisms Manual" will be distributed as consolation prizes.



Awarded First Prize : Saloon Coupé, with dickey-seat (John Russell, Edinburgh)

Results :

After careful consideration the awards in Section "A" (British Isles) have been finally allocated as follows :—

First Prize (cheque for £5-5s.) :
John Russell, 114, Spring Gardens, Abbeyhill, Edinburgh.

Second Prize (cheque for £3-3s.) :
Edward Baker, 1, Victoria Terrace, Frinton-on-Sea, Essex.

Third Prize (a tie, cheque for £1-1s. will be sent to each competitor) :
W. Riley, 126, Dewsbury Road, Ossett, Yorks., and R. A. Webber, 35, Adys Road, London, S.E.15.

Prizes of 10/6 each :
John V. Hudson, 51, Briar Avenue, London, S.W.16; Kenneth Smith, 28, Granville Road, Gravesend, Kent; Q. S. Moore, 21, Park Avenue, Barry, Glam.; R. Stockton, 6a, Khartoum Road, London, S.W.17; Kenneth Brookes, 1, Shaw Place, Leek, Staffs; Chris. Brimble, 29, Rathbone Road, Bearwood, Birmingham; R. A. Pervanoglu, 78, Wiverton Road, London, S.E.26; R. Michell, Bella Vista, Wilmington, nr. Honiton, Devon.

The following competitors, who are amongst those gaining Certificates of Merit, have been selected as deserving particular mention :
W. S. Clayton, Clondalkin, Ireland; R. Batchellor, Beckenham; J. King, Glasgow; L. White, Bletchley; R. Painter, Manchester; J. Bailey, Maryport; E. Humes, Norwich; P. W. Bedale, Cambridge; H. Jones, Maybole, Ayrshire; L. Harris, Camborne; J. Fletcher, Bingley; R. Holmes, New Mill, Nr. Huddersfield; Harold Frost, Coventry; L. H. Nash, Uxbridge; A. H. Miles, Leighton Buzzard; J. Paul, Cardenden, Fifeshire; D. Miles, Hall Green, Nr. Birmingham; E. Strange, Saffron Walden; C. H. Harrison, Blackpool; R. Viney, Manchester; R. McLeod, Kilmarnock; G. Lawson, Seascale; W. T. Vale, Liphook; A. Russell, Hall Green, Birmingham; F. G. Moody, Wimbledon Park; C. K. Kernahan, Belfast.

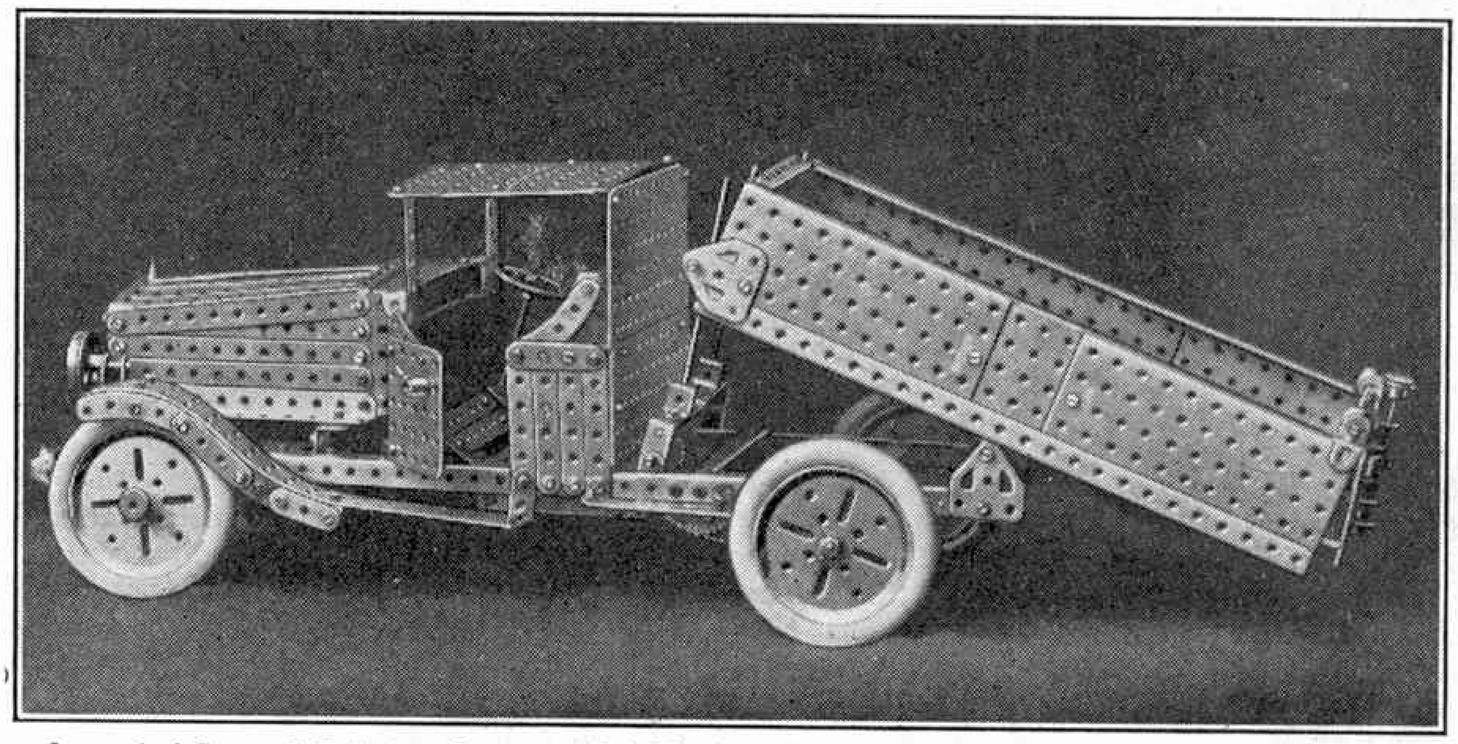
The First Prize Winner

The realistic two-seater motor-car that secures first prize is illustrated on this page. It is of the latest and most luxurious design and includes a dickie, luggage carrier, and other refinements of the modern touring car. It is constructed entirely from Meccano parts with the exception of the discs fitted to the road wheels. These are shaped from wood, but, of course, may be dispensed with if desired. The wheels are fitted with Meccano Rubber Rings and are carried in laminated springs. The steering gear is most realistic and efficient in operation. The front stub axles are journalled in Flange Wheels, which are secured by bolts passing through their upper and lower holes to two Couplings mounted on a vertical 2" Rod secured in the chassis of the car. The stub axle mountings are rocked about this pivot by means of a lever action similar to that described in the Meccano Chassis steering gear (see Meccano Standard Mechanism No. 115). I would draw attention, amongst other points, to the excellent construction of the mudguards and to the door, which is built up from short strips and mounted on Meccano Hinges. Flange Wheels serve as head-lights, whilst ¾" Contrate Wheels take the place of side-lamps. Miniature fittings are mounted on the dash-board, and a Spring-Buffer represents a mechanical horn.

A Mechanical Tipper

An excellent model of a commercial tipping-lorry gains the second prize. The lorry is driven by a Clockwork Motor representing the engine, the power being transmitted through a clutch and gear-box, while Sprocket Chains form the final drive to the road wheels.

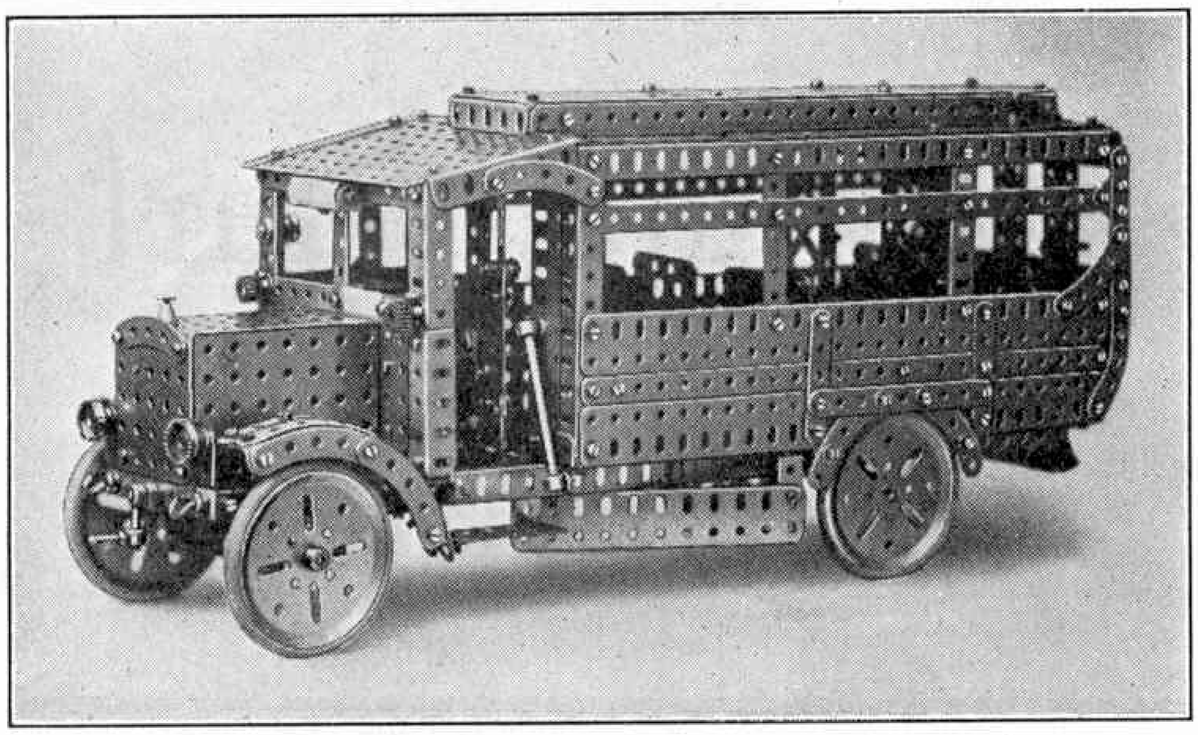
The clutch consists of two 1½" Contrate Wheels, one of which, with set-screw extracted, is secured to a 1½" Sprocket Wheel, also without a set-screw, by means of ½" Bolts. The two wheels thus bolted together are slidable upon the shaft leading to the gear-box, and their movement is controlled by a foot pedal. On operation of the latter the sliding Contrate Wheel may be brought in or out of engagement with the second Contrate Wheel, which is secured to the gear-box shaft. The sliding Sprocket Wheel is driven from the engine by chain gear.



Awarded Second Prize : Commercial Tipping Lorry (Edward Baker, Frinton-on-Sea)

The gear-box contains two speeds forward and a reverse, each of which may be brought into operation by the movement of a lever on the right-hand side of the chassis.

The tipping motion is effected by placing the gears in the neutral position, when one of the 50-teeth Gear Wheels in the gear-box is brought into engagement with a ¾″ Pinion beneath the driver's seat. The axle on which the Pinion is secured passes through to the back of the cab and by means of a ½″ Pinion and ¾″ Contrate Wheel drives a transverse shaft carrying two Bevel Wheels. These gear with similar wheels secured to two Threaded Rods, which pass through the threaded bores of Couplings pivotally attached to the tipping portion of the lorry. Consequently, the latter is forced slowly up or down as the Threaded Rods rotate.



Awarded Third Prize (tie) : Passenger Motor Coach. (W. Riley, Ossett)

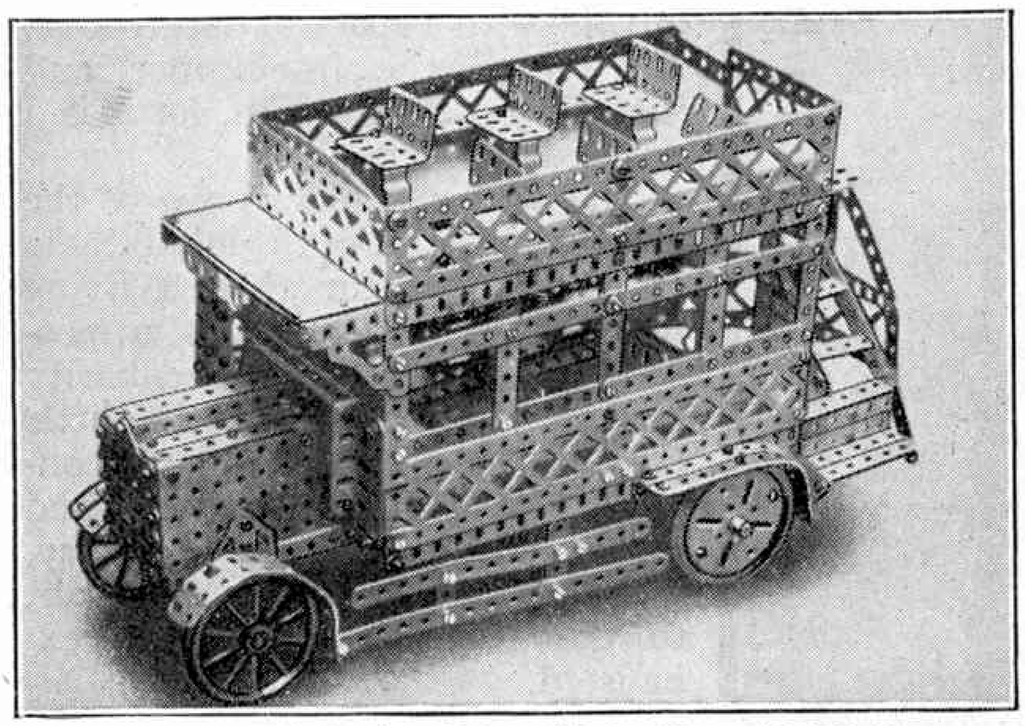
Note inner door alongside driver's seat, starting handle, etc.

Tie for Third Prize

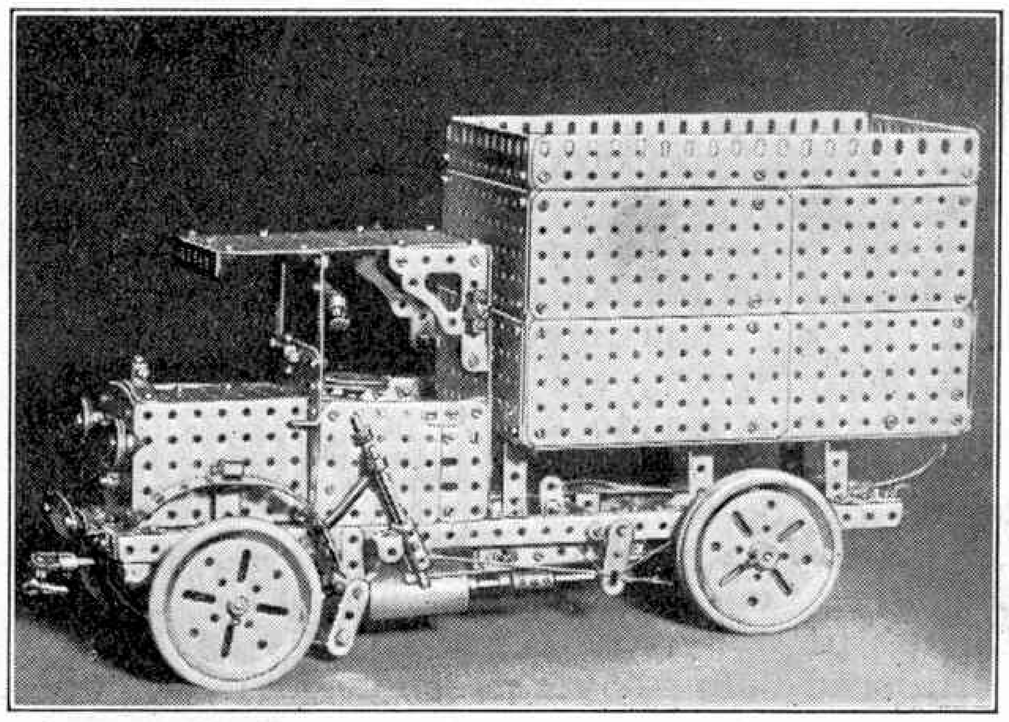
Two entries tied for the third prize, both being excellent models of motor-omnibuses. The first is of the single deck type, and is complete down to such details as seats, opening doors, destination plates, etc. An emergency door is fitted at the back of the coach. A step is mounted pivotally upon an Axle Rod secured immediately below this door, and is carried normally in a folded position. It is so held by an Angle Bracket bolted to the door; hence, as soon as the emergency door is opened, the step falls into position ready for use.

A partition separates the rear portion of the saloon from the remainder for the use of smokers. A seat composed of two 2″ and one 1½″ Flat Girders placed end to end stretches across the back of the coach. The 1½″ Girder is situated in the centre of the seat and is attached to one of the adjoining 2″ Girders by means of a Hinge, in order that it may readily be lifted out of the way to permit of free access to the emergency door.

A passengers' entrance is provided by another door set into the partition at the rear of the driver's seat. The method by which the doors are fastened should prove interesting, since it may be applied to a number of Meccano models. A Threaded Pin, secured in one hole of a Flat Bracket, is passed through the Strip forming the outer edge of the door. A Collar, with a second Threaded Pin inserted in the place of its set-screw, is then secured to the first Threaded Pin to form a handle, one or two Washers first being placed between the Collar and the door. On moving this handle the Flat Bracket is caused to slide behind the jamb of the door, so fastening the latter in position.



Awarded Third Prize (tie) : Motor 'Bus. (R. Webber, London, S.E.15)



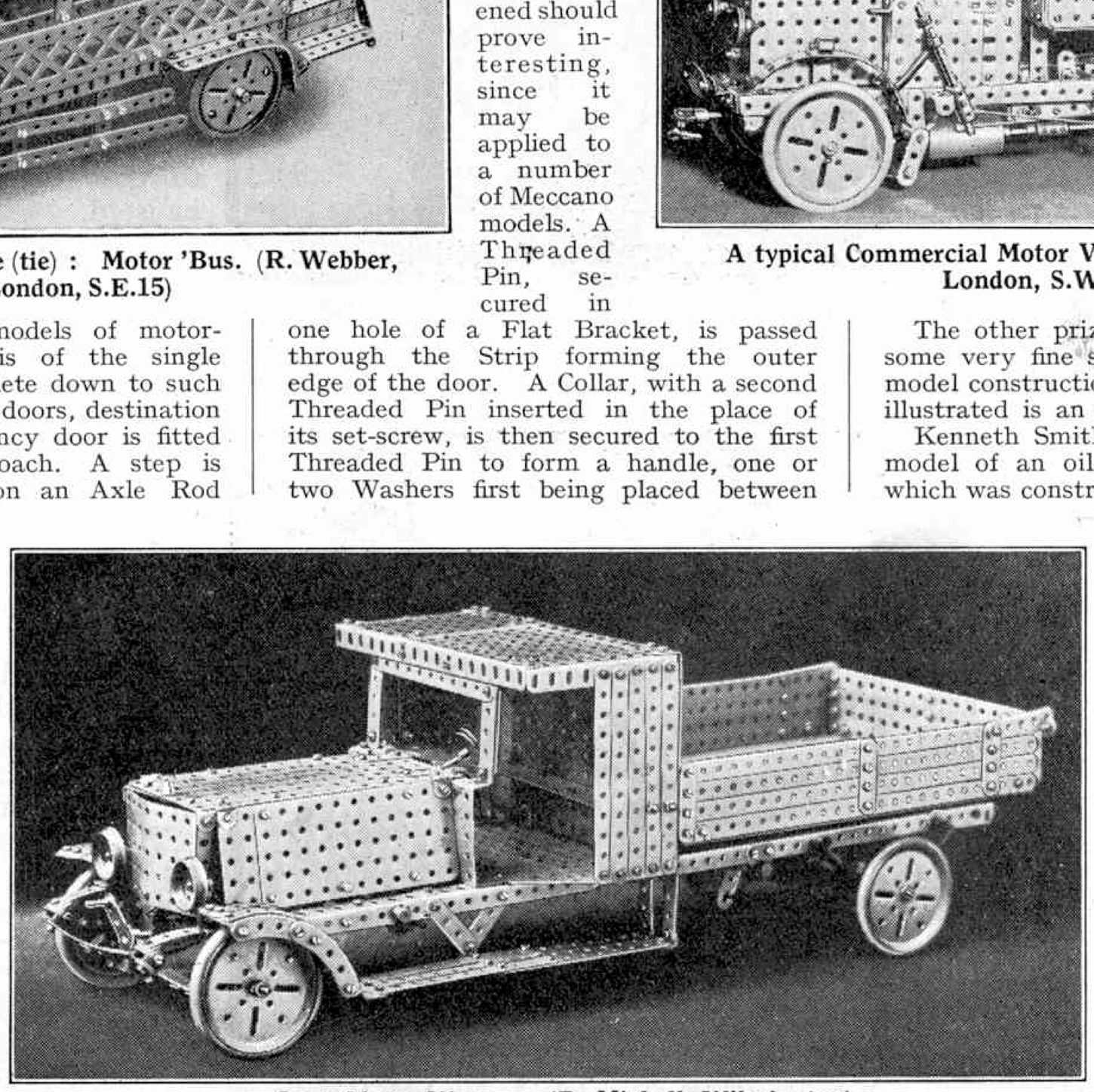
A typical Commercial Motor Van. (G. V. Hudson, London, S.W.16)

A Famous 'Bus

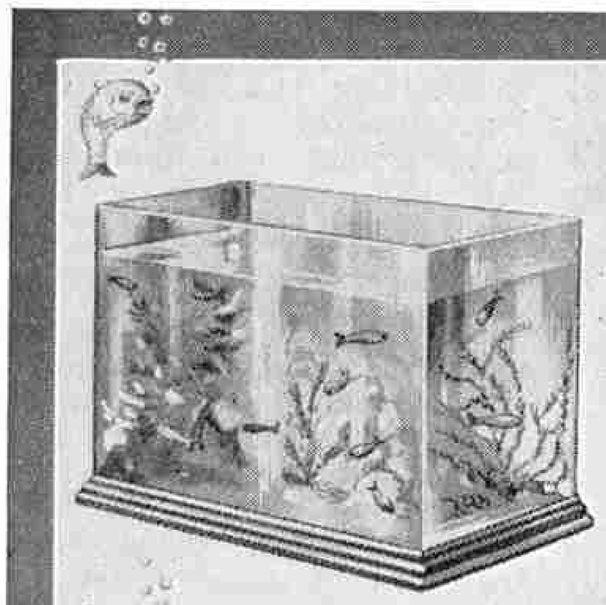
The second motor-bus is modelled from the famous type so familiar in London. It is well built, and appears almost as sturdy and comfortable to ride in as its giant prototype, which, with the help of some 5,000 of the same class, carries every day several millions of passengers a distance equal to a journey completely round the world! The model is fitted with seats both inside and on the top deck. The driver's seat is correctly placed alongside, instead of behind, the engine. Much amusement may be derived from the design of miniature advertisements, destination boards, etc., with which to decorate the 'bus, and such additions will result in a pleasing and most realistic model.

The other prize-winning entries include some very fine specimens of this type of model construction, and the Motor Wagon illustrated is an excellent example.

Kenneth Smith submitted an ingenious model of an oil-tank lorry, the tank of which was constructed from a series of 12½″ Strips bolted to the outer rims of two Hub Discs, while a Motor Fire Escape, built by R. A. Pervanoglu, showed particular merit. R. Stockton entered a reproduction of an L.C.C. refuse lorry, the body of which is mounted on four small wheels. Whilst collecting the refuse this portion is used as a separate unit and is drawn by a horse. As soon as it is filled, however, it is run on to the lorry and so conveyed more expeditiously to the destructor, where its contents are dumped.



Open Motor Wagon. (R. Michell, Wilmington)



How to Start an Aquarium.



By W. COLES-FINCH
(Resident Engineer, Chatham etc. Water Co.)

IT is often supposed that the inhabitants of an aquarium consist solely of fish, but this is by no means the case. In addition to the popular types of fishes there are many small creatures that may well be studied and the keeping of which affords considerable interest.

In some cases it is well to keep these small creatures entirely separate from fishes as otherwise they will entirely disappear, serving as food for the other inhabitants of the aquarium. Water fleas, for instance, are very interesting creatures to study, but as they are a delicacy to fish a colony of these interesting creatures soon disappears if kept in the same tank as hungry fish! Often part of the tank may be partitioned off, however, and special partitions may be arranged for separating the fish and keeping them away from the small creatures that form their food. Perhaps an even better plan is to have a separate tank entirely for these tiny creatures, which tank need not necessarily be an elaborate affair.



Water Spider looking for a site for her nest

A Remarkable Creature

Among the more interesting of these small inhabitants of an aquarium is the Water Spider (*Argyroneta aquatica*), a wonderful creature. The writer has kept these creatures for many years and found no little delight in photographing them in their aqueous home.

They are sometimes known as "Silver Spiders," from the manner in which their bodies are made to resemble burnished silver by the atmospheric air bubbles that become entangled in the fine hairs.

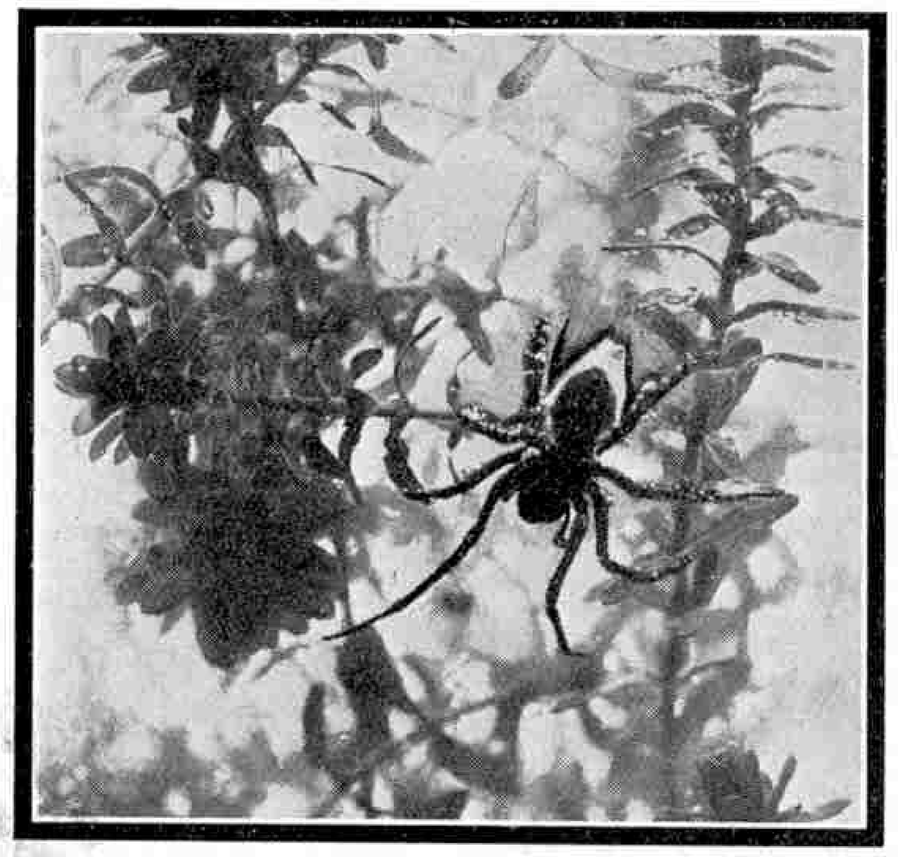
The Water Spider should have a vessel entirely to itself, prepared as described in previous articles in the matter of plant life, in which it can live without fear or interference by other creatures. Living in these peaceful conditions it will readily construct its beautiful nest, a task that will fascinate anyone with a spark of nature love, and prove the intelligence and ingenuity of the artisan, for it is a dexterous creature.

The Water Spider is one of the most remarkable of the inhabitants of our ponds, for though living under water it breathes atmospheric air. In this peculiarity lies all the wonder of the little creature's working, for it constructs its home under water and inflates it and, when necessary, recharges it with atmospheric air, so that this never becomes exhausted.

The Spider's Wonderful "House"

The spiders shown in the accompanying photographs were obtained from Cambridge, but any dealer will obtain specimens to order.

When first installed they took up comfortable quarters under a floating patch of Willow Moss (*Fontinalis antipyretica*) which, as the photographs show was heavily covered with beads of oxygen. There they put in most of their time, merely running a few confused straggling threads leading to the pebbles on the bottom of the tank, these being the preliminaries of the framework of their building.



Water Spider diving with air bubbles. Note beads of oxygen on spider's legs and also on the Canadian water weed

The *Argyroneta* is a large spider. Its abdomen is olive colour, and the rest, including the legs, is of a dark reddish-brown. Unlike the "Garden" and other spiders, the male is the larger. While the house spider constructs the floor of its web of such fineness that it will support water, the *Argyroneta*

constructs a web under water of such fineness that it will imprison air! Thus the "Diving Water Spider" is rather amphibious than aquatic, although it spends most of its time under water.

Now as to its marvellous house! The spider weaves its silken cell between the branches of some aquatic plant, or anchors it to any object that may suit its purpose. The house is usually entirely submerged, sometimes near the surface, sometimes near the bottom of the tank. It is beautifully transparent and oval in shape, resembling in size half the shell of a pigeon's egg, with the opening or entrance downward in the fashion of the ancient "Diving Bell."



The spider in her nest beneath the water. (Note egg of newt on leaf of water-weed on the left)

Charging the Nest with Air

Before the spider can occupy her transparent chamber comfortably it must be filled with air, and the manner in which this is accomplished is both wonderful and interesting. As the spider rises to the surface of the water, she turns the extremity of the abdomen upwards, and by a sharp snap of the hind legs obtains a bubble of air, which is automatically entangled in the hairy covering of the body. Holding the bubble by the two hind legs, which are crossed at an acute angle near the extremity, she descends quickly and releases the air at the entrance of the chamber.

By repeated efforts of this kind the spider fills the chamber, and by sundry internal smoothings and pressings of the silken dome, to get it into shape, all the water is at last displaced by the air and a chamber having the appearance of a transparent globe of burnished silver is the result. Some 14 journeys are necessary to complete the inflation.

In this subaqueous dwelling *Argyroneta* lives. It is here she devours her prey and lays her eggs, spinning a white silken cocoon at the top of the dome for them. Here her young, about 100 in number, appear in about a fortnight, and remain for a few days.

Almost directly they leave the nest in which they have been born the young begin to construct small homes of web and air for themselves.

It is interesting to note that the male as well as the female constructs such cells, and during the summer no less than the winter.

Feeding the Spiders

Dr. Bateman states:—"In one of these subaqueous homes the *Argyroneta* spends the greater part of the winter. I have had several spiders that have remained in their nests under water for three or four months, without either moving or taking food. When the female wishes to lay her eggs, she either enlarges her old nest or builds an entirely new one. . . . The male spider often makes a new nest for himself near to the one his lady-love has constructed or enlarged for her eggs."

These spiders do not like stagnant water and owing to their sadly depleted numbers they are now difficult to find in many ponds where once they were common. Any reliable dealer will supply them, however.

As regards feeding, the best method is to stock the tank with water-lice and other small creatures from the pond and leave the spiders to fend for themselves. Hunger should be avoided, as when hungry the spiders have decidedly cannibalistic habits!

Unfortunately we must pass over many points of interest concerning the *Argyroneta*. A note of the death of my favourite may interest the reader, however, as her picture appears in the accompanying illustrations. Before taking my annual holiday I saw that the tank was in a healthy condition and that the plants were thriving and giving off oxygen freely. The larder was replenished with water-lice, which the spider dearly loves. I foolishly thought that she would take one or two daily to appease her appetite, searching for them among the plants and stones. I was mistaken!

On arriving home I found her resting on a plant in quite a natural way, but she was very thin. I also noticed that the silvery bubble had disappeared from the abdomen, but I still thought that she was merely hungry. I shook the vessel to make her move, when, to my surprise and dismay, her form collapsed and body and legs parted, all falling separately to the bottom of the vessel! I emptied the tank, and search then showed that not a single insect was left. She had probably devoured the whole lot during the first few days, having more than was good for her, and later had starved for want of food.

Spiders are not Insects

I should like to take this opportunity of reminding readers of the "*M.M.*" that spiders are not insects, although they are very often classed as such by those who do not know any better. They belong to the *Arachnida* and are a well defined group of a great branch of the animal kingdom. As a matter of fact, they were at one time classed as insects by Linnæus, but were separated into a distinct class by Lamarck. This class is noteworthy as having an external skeleton, the different parts of which are jointed together in a wonderful manner. They have not a brain in the same sense that the vertebrate animals have, but their nervous system springs from enlargements, or knots, called *ganglia*. It is therefore not incorrect to say that these creatures have a number of brains scattered over their tiny bodies. In this respect they resemble bees and wasps. A wasp will not necessarily die even when cut in two, because its *ganglia*, or "local brains," continue to act for a short time, whereas in vertebrates and in man, death occurs immediately should the head be severed from the body.

Spiders form very interesting pets and may be kept for a long time in confinement if they are fed with flies, or other suitable food. The Water Spider, described above, is not the least interesting of this great family, and perhaps the next in order of popularity is the beautifully-marked Garden Spider, the spinner of those wonderful "cart-wheel" webs that present such a magnificent spectacle in the early morning when covered with dew.



The Story of Metals

VIII GOLD.

LAST month we described some of the treacheries and deeds of violence brought about in bygone days by the lure of gold. This month we shall see how the fatal fascination of this metal has produced almost incredible scenes from time to time in the madness of a "gold rush."

In whatever part of the world a gold rush has occurred, the main features have always been the same—first, the announcement that gold has been found in large quantities in a certain region; then the wild stampede of men of all ages and occupations and from all parts of the world. In every case a small proportion of the physically stronger or more fortunate men have reached the goldfield quickly and made fortunes in various degrees, while thousands have either broken down or died on the way and never reached the gold field at all, or after desperate struggles have reached their destination, only to find that they were too late.

A Typical Gold Rush

A typical gold rush occurred in Upper California in 1848. Early in that year the owner of a saw mill situated on a tributary on the Sacramento River was walking along the bank of the stream when he noticed something glittering at a point where the bank was crumbling away. At first he took no notice, but later, after he had come across other glittering objects, he stooped down and picked one up and found it to be gold. He at once informed a friend and the two decided to keep the discovery secret and in the meantime to investigate further. They examined the stream in both directions and soon collected an appreciable quantity of gold. Their movements did not pass unobserved, however, and soon the secret was out.

It was not long before a labourer who had collected some twenty ounces of gold arrived with his treasure at San Francisco and immediately the town went mad. Labourers, shop-keepers, clerks and professional men of all kinds were seized with the gold fever, and rushed off either alone or in small parties to the diggings. The news of the gold find spread rapidly and large numbers of gold seekers began to arrive at San Francisco by sea. Comparatively few of the new arrivals could afford to pay the extortionate prices charged for even the most miserable lodging, and the remainder encamped on the beach, which rapidly became a slum of the worst type. No sanitary arrangements of any kind were made and sickness quickly broke out, while the only semblance of law and order was that enforced by individuals at the point of the revolver.

Terrible Conditions

The journey from San Francisco to the goldfield occupied many days and fatigue and thirst exacted a heavy toll among the travellers. Matters were made worse by the Indians, who constantly swept down at night to steal horses or anything else of value. On arrival at the mines the gold seekers found the conditions about as bad as they could be. The miserable tents in which they lived afforded little shelter from heat and heavy rain, and the crowding together of many nationalities resulted in continual race quarrels and a good deal of serious fighting, in which revolvers, knives and other weapons were freely used. Disease of all

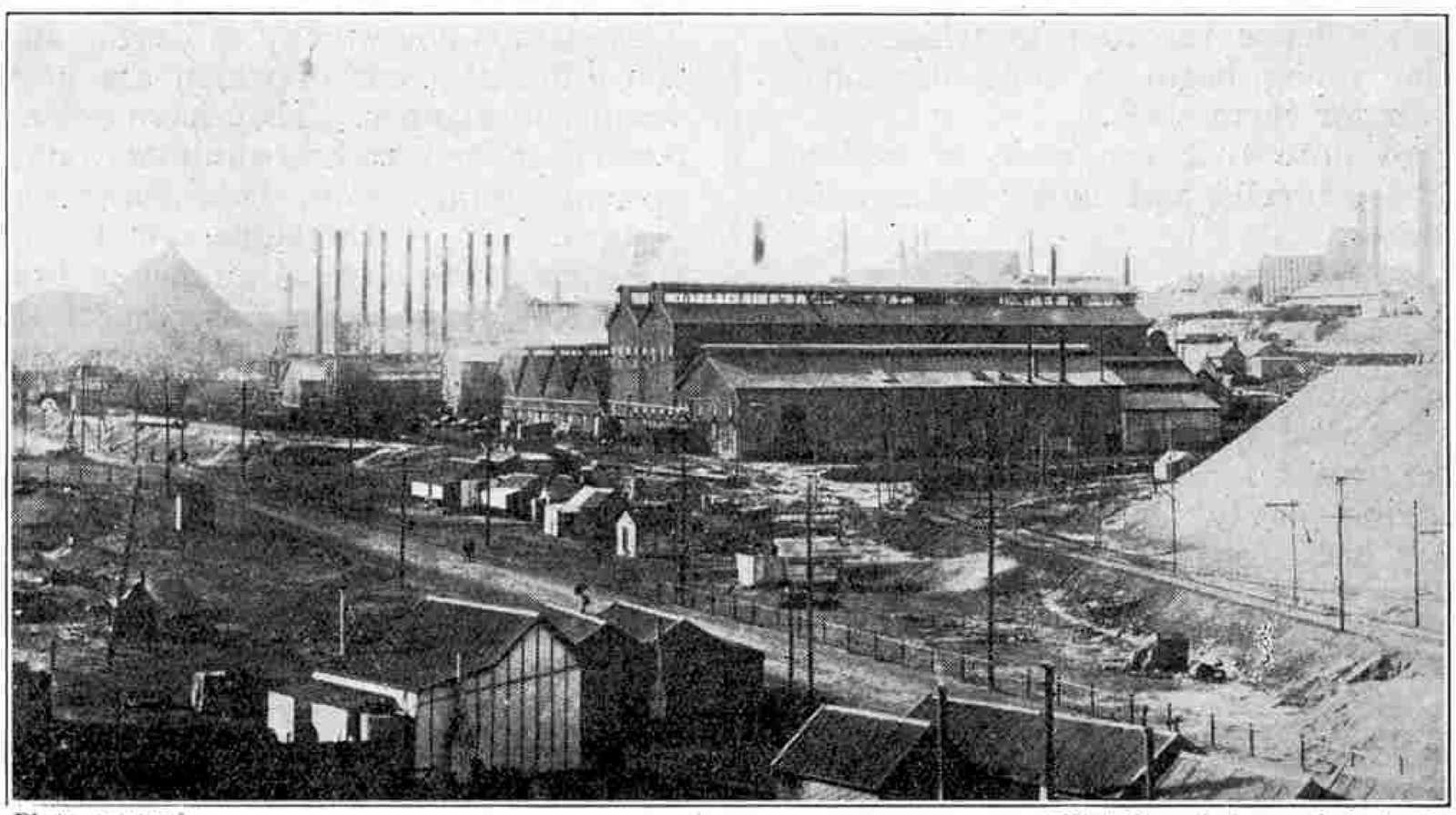


Photo courtesy [*High Commissioner of Australia*

Golden Mile, Kalgoorlie, West Australia

kinds broke out and the sick suffered terribly because they were utterly neglected, their healthy companions being too much imbued with the gold fever to attend to them. There is no doubt that scores died from starvation.

Many of those who reached the diggings in the early days of the rush made large fortunes, but thousands of others, after working desperately hard day after day, found that their small find of gold was little more than sufficient to pay for their daily requirements, the cost of living being so high. Provisions and stores and implements of all kinds were sold at twenty or thirty times their normal price and many of the store-keepers amassed quite large fortunes.

The rush lasted some five years and it is estimated that at its height the miners numbered close upon 100,000. Gradually the gold at or near the surface became exhausted and the gold seekers decreased rapidly in numbers, leaving behind a small proportion of more serious miners provided with the necessary equipment to continue operations at greater depths.

The Klondike Rush

A more recent and even more remarkable gold rush was that to the Klondike in 1897. In the previous year a miner, who had been prospecting without luck for many years, came across gold in remarkable quantities on the banks of the Bonanza Creek and promptly registered his claim at the mining town of Forty-Mile. The news spread in the wild-fire manner that is characteristic of a gold find, and practically the whole of the inhabitants of Forty-Mile set out for the goldfield. These earliest arrivals made large fortunes in a very short time and the wisest of them got safely away with their gold by steamer to San Francisco.

Then the rush began, and from all parts of the world men of all ages left their occupations and set out for the Klondike. Most of these adventurers had little idea of the appalling difficulties of the journey and large numbers of them started off with pitifully inadequate equipment. The easiest route was by steamer up the Yukon River, but this was also the longest route and consequently those who had the gold fever most acutely took the overland route, which involved crossing either the Chilkoot Pass or the White Pass.

Of these passes the former was the worse. Mr. Harry de Windt, writing in the "*Strand Magazine*" towards the close of 1897, said: "I have roughed it for the past 15 years in Siberia, in Borneo, and in Chinese Tartary, but I can safely describe that climb over the Chilkoot as the severest physical experience of my life."

A Graphic Description

The White Pass was less difficult to negotiate, but nevertheless it proved disastrous to many of those who attempted it. Mr. A. Heilprin, who crossed this pass in 1898, gives the following description in his book "*Alaska and the Klondike.*"

"The desert of Sahara, with its lines of skeletons, can boast of no such exhibition of carcasses. Long before Bennet was reached, I had taken count of more than a thousand unfortunates (horses) whose bodies now made part of the trail; frequently we were obliged to pass directly over these ghastly figures of hide, and sometimes, indeed, broke into them. Men whose veracity need not be questioned assured me that what I saw was in no way the full picture of the 'life' of the trail; the carcasses of that time were less than one-third of the full number which in April and May gave grim character to the route to the new Eldorado. Equally spread out, this number would mean one dead animal for every sixty feet of distance!

"The poor beasts succumbed not so much to the hardships of the trail as to lack of care and the inhuman treatment they received at the hands of their owners. Once out of the line of the mad rush, perhaps unable to extricate themselves from the holding meshes of soft snow and of quagmires, they were allowed to remain where they were, a food offering to the army of carrion eaters which were hovering about, only too certain of the meal being prepared for them. Oftentimes, pack-saddles, and sometimes even the packs, were allowed to remain with the struggling or sunken animal—such was the mad race that the greed of gold inspires."



Photo courtesy] [*High Commissioner of Australia*

The Prospector

Control of the Goldfield

It was not long before the towns of Dawson and Klondike, which began as small groups of huts, became

(*Continued on page* 246)

The Commercial Side of Engineering

And the Training Necessary to Succeed

By a Managing Director

[The following article, which is reprinted from "Engineering," by permission of the Editors, will without doubt interest many of our readers and probably help some of them in the choice of a career.—EDITOR.]

ONE frequently hears of the difficulty experienced by youths in finding remunerative employment as engineers. This difficulty undoubtedly exists in many branches of the trade (or profession), but I am of the opinion that there is one branch, and an attractive one too, which is commonly overlooked—I refer to the commercial side of engineering.

I speak as one who has been trained in works, a technical school, and a university, and, after gaining a wide practical experience, I am now the managing director of a large and important firm of engineers.

Good Prospects for Suitable Men

The branch to which I refer is that of commercial representative in home and foreign countries, and there appears to be a real difficulty in getting hold of suitable men to fill such posts even when good remuneration is offered. The lack of supply of such men is, I think, due to the fact that youths are not alive to the existence of such openings and consequently do not get the proper training to fit them for posts of this description. It may, therefore, be of help to some, if I outline the course of training which, in my opinion, will best fit them for such openings.

Practical Training Required

The type of youth required for this branch should be of good physique, smart in appearance, of good character, fond of outdoor sports, and sensible.

After a good general education he should go into some engineering works when about 16 years of age, where he will work exactly the same hours, and under the same conditions as the other regular employees. The firm will see to it that he gets shifted to various departments, and also to outside erection work, as they think desirable.

For two or three evenings a week from 16 to 21 years of age, he should attend evening classes bearing on his future work.

Must Not be Afraid of "Dirty Work!"

It may be well at this stage to state that I do not consider youths who have been through a course of training at a technical school or university as suitable for the positions I have in view, mainly because they are too old to start on practical work in the shops after their technical training, and, moreover, if they have done what their teachers at college term "well," they nearly always get swelled heads, which unfits them for what they regard as "dirty" menial work in the shops.

The commercial man, in my opinion, does not require an advanced technical training, but it is absolutely essential that he should be well up in the details of the plant and wares turned out by his firm. He must also be able to talk intelligently to clients about the plant for which he wishes to get orders.

Drawing and Commercial Office Training

At about 20 or 21 years of age, the youth should go into the Drawing Office for at least a year. This is not with a view to his becoming an expert draughtsman, but to enable him to follow drawings and to get out general arrangements, in view of the probability of his having in the future to send home such schemes to his firm for them to base their estimates and tenders upon. In general, the details of such schemes will be got out by a draughtsman sent from headquarters.

Another year or so should be spent in the commercial office of the firm, where he will get an insight into costing, ordering materials, office practice, book-keeping, &c. This will bring him to about 23 years of age, when he will be qualified to go as an assistant to one of the firm's representatives.

Remuneration on the Commercial Side

No premium will be asked from youths undergoing such a training, and the remuneration up to 21 years of age would be the standard weekly rates of pay for the district. After that he would receive increases until he went out as an assistant to one of the firm's representatives at a starting salary of about £150 per annum. His prospects would be anything up to £1,000 per annum, or more according to his success.

The firm I represent would be glad to meet with two or three youths who are willing to undergo such a course, and doubtless there are many other firms in the country in the same position as ourselves at the present time and there are likely to be more in the future.

Story of Metals—(*continued from page* 245)

towns of considerable size, complete with newspapers, theatres and banks. In this respect the goldfield presented a great contrast to the state of affairs in the California rush of 1848. Another great contrast lay in the fact that there was comparatively little danger to life or property on account of the iron rule of the North-West Mounted Police. This splendidly organised force kept the goldfield free from men whose records were known to be bad, and maintained law and order with such efficiency that serious crime of any kind was comparatively rare.

As was the case with the diggings of Upper California, the surface gold of the Klondike was quickly exhausted, and presently the goldfield was left in possession of those who were prepared to develop it on scientific lines. The days of quickly-made fortunes are over in this region but an enormous amount of gold still remains below the surface—probably far exceeding the quantity already taken out.

Scenes in Australia

Remarkable gold rushes have occurred also in Australia. In 1850 a prospector named Hargraves who, along with many other Australians, had emigrated to California in search of gold, was struck with certain similarities between the gold-bearing regions there and certain districts in New South Wales. He returned to Australia and in the following year discovered gold near Bathurst. Immediately the discovery was announced the usual scenes took place and a large proportion of the population of Sydney rushed to the goldfield. Shortly afterwards gold was discovered at Ballarat in Victoria, and the gold fever promptly attacked Melbourne and Geelong.

As news of the goldfield spread, prospectors from all parts of Australia, and also from China and even Europe, began to arrive in large numbers, and the treasure hunt was carried on at fever heat. A feature of this Australian goldfield was the discovery from time to time of quite large nuggets and the finding of each of these produced a fresh wave of excitement.

Many of these nuggets were of quite extraordinary size and in a future issue we hope to give some particulars of the most famous of them.

Since that period many other enormously rich goldfields have been discovered in various parts of Australia, among which the Coolgardie fields, situated about 350 miles east of Perth, are specially famous. These goldfields presented a serious problem on account of the shortage of water, but the Government tackled the problem and solved it by conveying water by pipe lines from springs in the Darling Range—a distance of some 350 miles!

NEXT MONTH:—

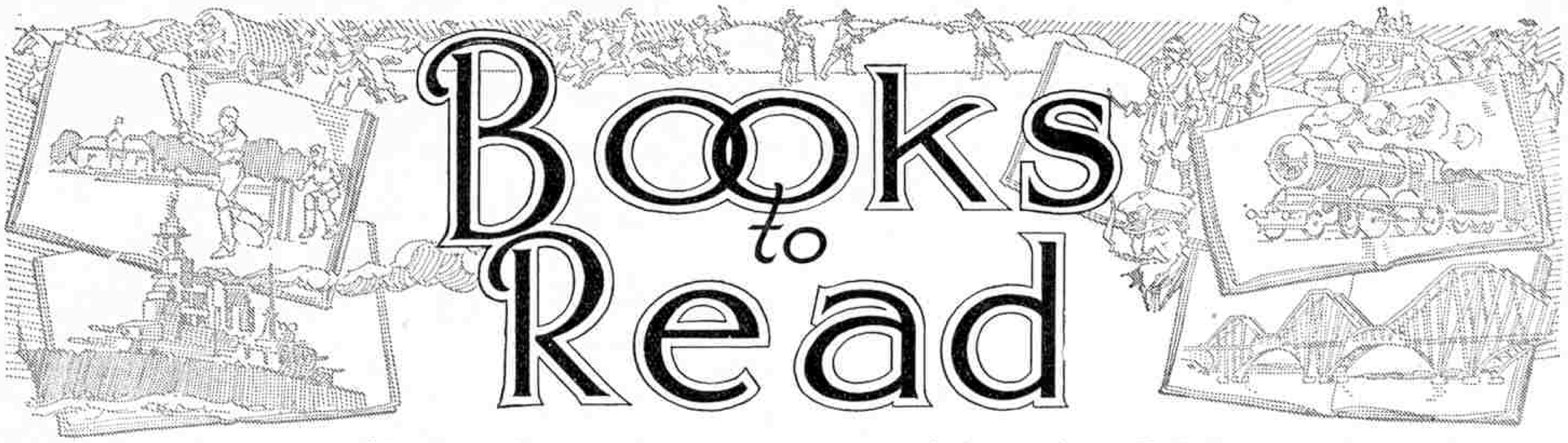
The World's Greatest Goldfield

Towers of Mystery—(*contd. from page* 221)

joining the engine room is a machine shop, completely furnished with lathes and tools. On the deck above is an electrically-equipped kitchen and laundry, ice-plant with refrigerator and cold storage, together with extensive living rooms for the "crew" and storage room for emergency ammunition and food. All the rooms are mechanically ventilated and lighted day and night by electricity.

The deck above the water-line carries recreation rooms and sleeping quarters while above this are two turrets, fore and aft, on the main deck which mount 14 in. naval guns. There are also four 6 in. guns in smaller turrets, two on each side. A battleship mast of the girder type serves as a look out, range finder and wireless aerial.

Altogether, therefore, this huge "stone-battleship" forms a very formidable defence for the harbour and one that could withstand a long siege, being entirely self-contained, with considerable storage room for provisions and ample accommodation for the crew.



Readers frequently write to me asking if I can recommend books that are both of interest and of use. On this page I review books that specially appeal to Meccano boys. I do not actually supply these books, which may be obtained either through any bookseller or direct from the publishers.—EDITOR.

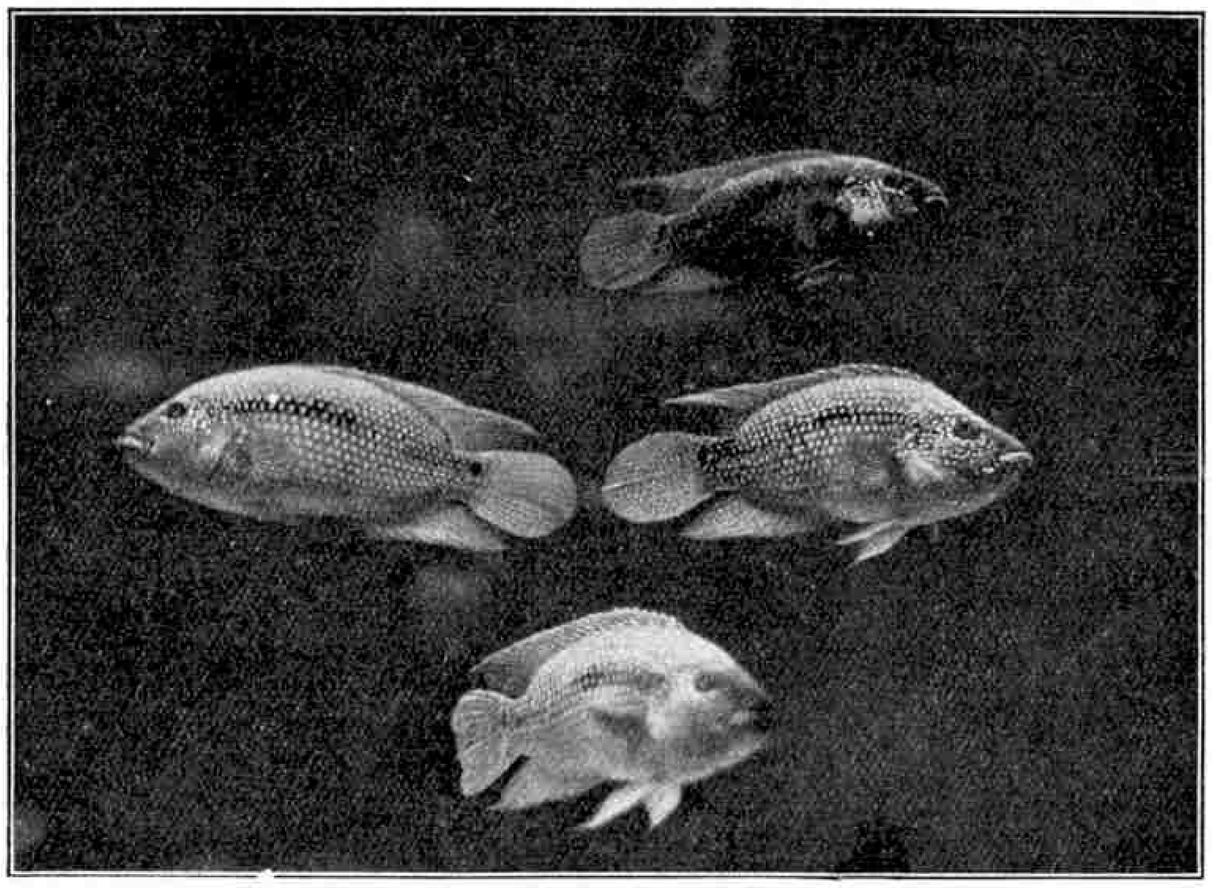
"The Aquarium Book"

By E. G. Boulenger

(Published by Duckworth & Co. Price 10/6)

In this book Mr. Boulenger, who is the director of the Aquarium at the Zoo, tells many entertaining stories of his charges and also deals with the many problems that arise out of the management of an aquarium. He gives a very complete account of the life-history of the inhabitants of ponds, rivers, and oceans that are kept in captivity at the Zoo, and the book will be found of considerable interest to all and especially to those who keep an aquarium of any kind—large or small, sea-water or fresh-water.

It is interesting to find that the Romans kept fish on a grand scale and spent enormous sums on the construction of their fish ponds. Even earlier than this the Chinese kept fish and produced many fancy breeds, the descendants of which delight us to this day. Every monastery and castle had a fish-pond in mediæval times, but in these cases the fish were kept for the table, rather than to be looked at and admired.



Cichlid Perch—one of the illustrations in "The Aquarium Book" reviewed on this page

Mr. Boulenger deals not only with fish—he has a good deal to say about other inhabitants of an aquarium and even the tiny fresh-water Sponges, Hydra, Water-fleas, Cyclops, and other similar creatures are not omitted. The book is illustrated with a number of drawings and some beautiful photographs, and we feel sure that all our readers who are interested in the subject will find it a mine of information.

The Empire Cruise

By V. C. Scott O'Connor

(Riddle, Smith & Duffus. 16/- net)

In this volume of 300 pages Mr. Scott O'Connor relates in a graphic manner the story of a voyage around the British Empire with the special service squadron of the Royal Navy. This squadron consisted of the two great modern battle cruisers "*Hood*" and "*Repulse*" and the light cruisers "*Delhi*," "*Dauntless*," "*Danae*" and "*Dragon*."

Early in the morning of the 29th November 1923 these ships left their moorings at Devonport and Spithead for a cruise of the Empire's ports. Before they returned, 10 months later, they had covered over 41,000 miles and had crossed the equator six times. In the course of their voyage they showed the White Ensign to the British Dominions and Colonies in West, South and East Africa, in Ceylon, Malaya, Australia, New Zealand and Canada and to many other places, including the South American Republics, the wonderful Hawaiian Islands and the Pacific Coast of the United States, the scene of many romantic adventures and thrilling exploits in the past.

The life of a squadron at sea is vividly described and we find that pleasure is not, as on a passenger liner, the main occupation of the Fleet even when on an Empire Cruise. It is very evident, too, that the routine of ceaseless preparation for sterner things, picturesque and interesting as it may be to the onlooker, involves much hard work. The description of the author's personal impressions of 16,000 miles of travel by land is written in a spirit and in language worthy of its theme. The variety and immense possibilities of the British Dominions are clearly demonstrated but one realises that underlying everything is the ceaseless and unflagging vigil of our Navy, without which the whole Imperial scheme would collapse.

Those of our readers who like a story of travel and of the sea will find the book of great interest. The illustrations, of which there are 65, many in colour, are excellent, and greatly add to the value of the book.

"E. T. Busk: A Pioneer in Flight"

By His Mother

(Published by J. Murray. Price 7/6)

Edward Busk, an engineer of great promise, was for two years attached to the Royal Aircraft Factory at Farnborough. Both he and his brother H. A. Busk were killed during the War, and this book has been written by his mother to place on record the early work of the brothers in connection with the conquest of the air.

Edward was educated at Harrow and Cambridge and liked to spend his holidays in the Lake District, where he had many interesting adventures. His early experience in climbing gave him an appetite for further adventures in the Alps and in Norway. Later, he joined the staff of the National Physical Laboratory and then went to the Royal Aircraft Establishment at Farnborough, where he was instrumental in designing the inherentally stable aeroplane, B.E.2 C. Here, in his 28th year, he met his death whilst carrying out tests in connection with the development of a stable aeroplane. During one of his flights to obtain first hand information he climbed to about 1,000 ft., when his aeroplane suddenly burst into flames and crashed.

Edward Busk was undoubtedly a genius in aeronautics and in the practical application of theory to flight. His brother, who joined the Royal Naval Air Service in January 1914, rose to the rank of Flight Commander and was killed on a bombing raid at Imbros. Readers interested in the early days of aviation will find the book of particular interest, and the brothers undoubtedly have claim to be included in the pioneers of flight, along with the many others who lost their lives in their attempt to contribute to the conquest of the air.

Railway Marvels

By C. J. Allen

(J. F. Shaw & Co. 2/6)

This book, profusely illustrated and dealing with every conceivable branch of railway engineering in a most interesting manner, will make a very strong appeal to our younger readers.

A very attractive coloured cover depicts one of the L.N.E.R. expresses leaving King's Cross. In the 96 pages there are no less than 111 illustrations and 7 coloured plates.

Ancient and modern engines, bridges and viaducts, the use of snow-ploughs in America and Switzerland, the actual work of the engine-driver and fireman, the story of the Canadian Pacific Railway, Miniature Railways, Railway Bridges that swing open, World-famous express trains each have a chapter devoted to them. It is certainly one of the finest Railway Books for younger boys that we have seen for a long time.

No. 2 Outfit Competition Results

Judging from the results of the " Outfit " model-building competitions our readers appear to possess an inexhaustible supply of new and ingenious ideas. I am taking a particularly keen interest in these competitions, for they are revealing several novel and fascinating aspects of Meccano construction, and I shall continue to illustrate each month in the Magazine as many of the prize-winning models as space will allow. The number of entries received in the competitions for Outfits Nos. 1 and 2 actually exceeds the fine record established by the " No. 0 " contest, although the majority is not very great.

The results of Sections A and B in the No. 2 Outfit Competition are as follows :—

Section A (boys under 12) :

1st Prize (Meccano Products to value of £2-2s.) : W. S. Elliott, 182, St. Paul's Road, Peterborough (Clothes-Washing Machine). 2nd Prize (Meccano Products to value of £1-1s.) : Anthony Messenger, 5, Priestfield Avenue, Rochester (Windmill Pump). 3rd Prize (Meccano Products to value of 10/6) : Edward Cain, 63, Strand Street, Douglas, I.O.M. (Mill Engine).

Section B (Boys over 12 and under 16) :

Prizes similar to those in Section A. First Prize : N. S. W. & J. Wheatley, " Bengarth," Hare Lane, Claygate (Derrick). Second Prize : J. J. McManus, Bridge End, Derry, Ireland (Drop Hammer). Third Prize : George E. Owen, 148, Henleaze Road, Bristol (Tram Car).

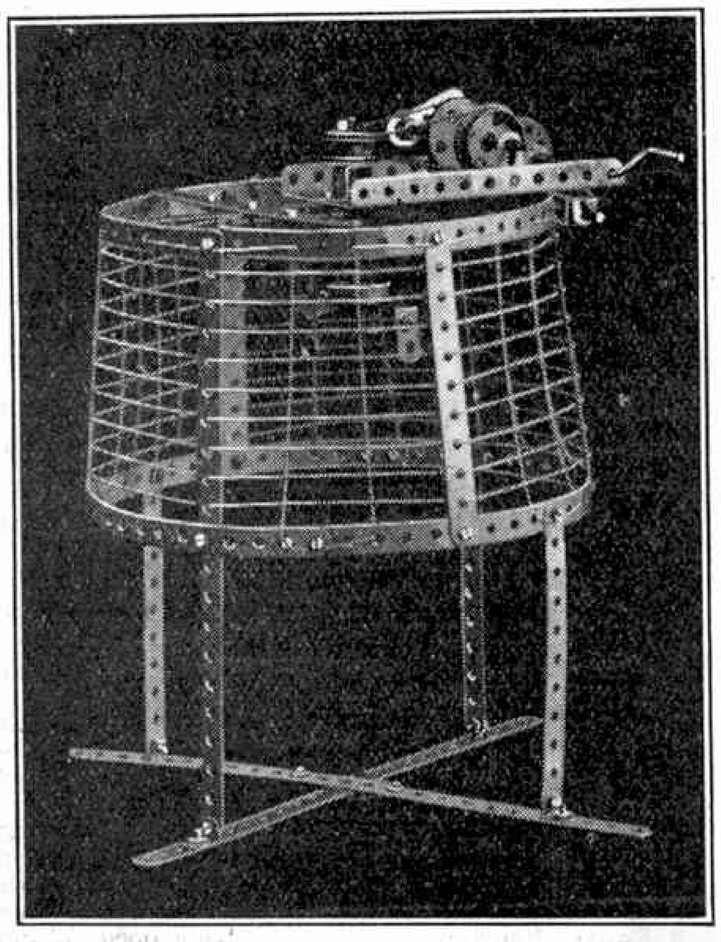
In accordance with the plan announced last month I am again presenting a number of complimentary copies of the " Standard Mechanisms Manual " to those competitors whose work shows outstanding qualities, whilst a limited number of Certificates of Merit will be awarded to the boys whose entries closely approach prize-winning standard. Amongst the competitors who gain the Certificates this month the following have been specially commended by the judges :—

Section A :

Hilda M. Clayton, Clondalkin, Co. Dublin ; W. R. Withers, Chester ; Raymond Emery, London, W.7 ; F. Hanson, Portsmouth ; R. T. Stokes, Birmingham ; Noel Gibson, Broadstairs.

Section B :

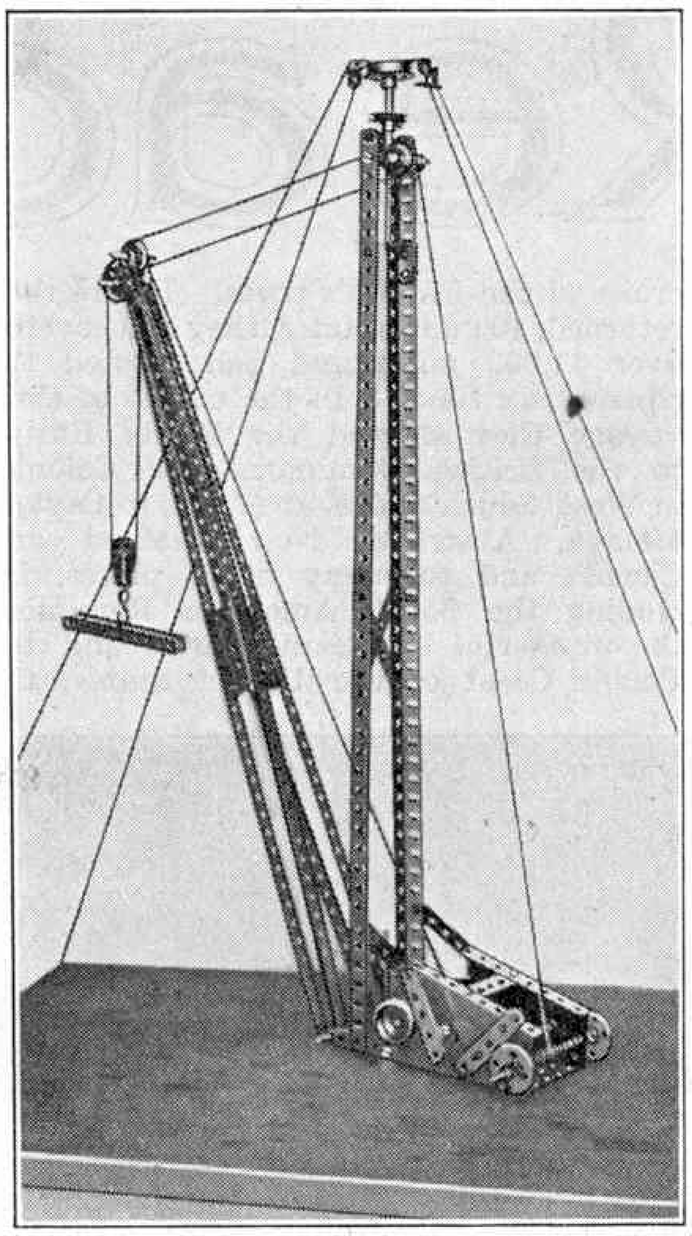
James Brown, Grangemouth, Scotland ; J. Cattaway, Westcliff-on-Sea ; C. N. Beattie, Lewes ; Spencer Reed, Bridgwater ; H. Taffs, London, S.E.18 ; E. Body, Liverpool ; R. Penrose, Plymouth ; Eric Copley, Brighouse ; A. Macleod, Leith ; R. Smith, London, S.E.14 ; Diana Meek, Bisley, Glos.



Clothes-Washing Machine, by W. S. Elliott (Awarded First Prize in Section A)

A New Meccano Derrick

The first prize in Section B has been awarded jointly to two brothers whose combined work has produced an interesting model of a builder's derrick. The upright column in this model is mounted pivotally



Derrick, by N. S. W. & J. Wheatley (Awarded First Prize in Section B)

upon a wooden base, and its top extremity swivels about an Axle Rod secured in a Flange Wheel. Two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are placed upon the axle and cords (representing the hawsers used in actual practice) tied to their ends are led down and secured one to each corner of the wooden base. The jib is built up from $12\frac{1}{2}''$ Strips, and is pivoted to the base of the crane. Its head is formed from two Flat Trunnions bolted by their centre holes to a Double Bracket secured in the end of the jib.

The luffing movement is controlled from a shaft carried in the ends of the Sector Plates forming the gear box, the operating cord being led over a 1" Pulley with set screw carried at the top of the upright column, and thence round a 1" Pulley in the jib-head, the cord finally being tied to the upright Angle Girders. The load is raised or lowered by means of a Crank Handle journalled in the gear box. The cord in this case passes over the Axle Rod which carries the 1" loose Pulley at the jib-head, and over a 1" Pulley with set screw as shown. It is then led round the Pulley attached to the load-hook and secured to the jib.

Friction brakes control the winding gear. These consist of two $2\frac{1}{2}''$ Strips bolted to Cranks carried on Rods journalled in the gear box. A piece of elastic is tied to the lower ends of the Strips, thus causing them to exert a continual pressure upon two Flange Wheels, secured one to each of the two operating shafts.

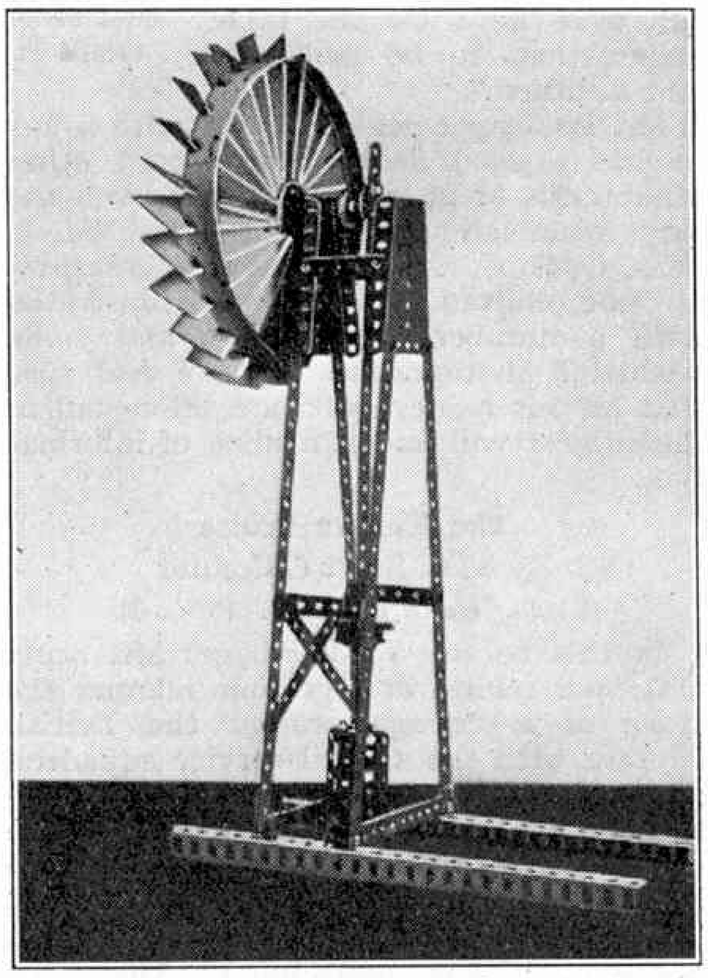
Clothes-Washing Machine

A very original model of a clothes-washing machine secures first prize in Section A. The revolving arms in the centre of the tub in this model are constructed from a series of Flat Brackets and Angle Brackets secured to a Flange Wheel mounted on a vertical shaft. This shaft is driven by means of cord passing round 1" Pulleys on its upper end and round Flange Wheels secured to a transverse Rod. The latter carries at one end a Crank connected by bolts and lock nuts to a $2\frac{1}{2}''$ Strip ; this in turn is similarly attached to a $\frac{1}{2}''$ reversed Angle Bracket bolted to a Bush Wheel on the operating handle. On rotation of the latter, therefore, the vertical spindle in the centre of the tub is caused to rotate first in one direction and then the other, owing to the fact that, while the Bush Wheel describes complete revolutions, the Crank on the secondary shaft is merely pushed to and fro and not in a complete circle. The central vertical spindle, together with the secondary shaft, etc., are mounted in a Flanged Plate pivotally secured to the side of the tub. In this way the mechanism may be lifted clear of the tub when it is required to remove the contents of same.

Pump Operated by Wind Power

Another illustration reproduced on this page shows the second prize-winner in Section A. This is a neat model of a pump, designed for operation by wind power. A strip of thin cardboard is laced with string to the circumference of a wheel formed from $5\frac{1}{2}''$ Strips bent in circular form. Twenty-four vanes, fashioned from similar material, are then attached, each vane having a slit cut in it which fits over the circular piece of cardboard. The inner ends of the vanes are laced together by a piece of cord.

The power derived from the rotation of the wheel is converted to a reciprocating motion and transmitted to the pump, situated in the base of the model, by means of a crank, secured to the driving shaft, and connecting-rod.



Wind-driven Pump, by A. Messenger (Awarded Second Prize in Section A)

Overseas Model-Building Competition Results

I am able now to announce the results of the first two Overseas Model-Building Competitions of the series. These monthly contests appear to be almost equally popular abroad as they are at home, and a very large number of entries, originating from all parts of the world, was received in the "O Outfit" and "Loco" Competitions, both of which closed on 27th February. A high standard of excellence was noticeable in the majority of the entries, and the final allotment of prizes proved to be a difficult task.

Overseas Loco Contest

First Prize (cheque for £5-5s.): H. G. van der Sluis, 16, Koekoeklaan, Den Haag, Holland. Second Prize (cheque for £3-3s.): Frank van Bulck, 31, Avenue Parmentier, Paris, XIe. Third Prize (cheque for £1-1s.): E. A. Rawlings, 5748, Bordeaux Street, Montreal. Prizes of 10/6 each: E. H. Forrest, 9, Laurentian Place, Ottawa, Canada; J. C. Keevy, Church Street, Douglas, Cape Province, S.A.; L. Fisher, 29, Gordon Road, Bertrams, Johannesburg; Marcel Pauwels, Rue de la Couche 9, Antwerp; J. Morris, Chalet Mourezin, Chateau d'Oex, Switzerland; W. L. Creasey, Elsinore, Simonstown, South Africa.

Special Commendation (Certificate of Merit): R. McLeod, Albert Park, Victoria, Austarlia; Nelson Eustis, Alberton, S. Australia; Charles Granthier, Bareilly, India; P. V. R. Babu, Basavangudi, Bangalore, India; Fritz Hunziker, Zurich.

Overseas "0 Outfit" Contest

First Prize (Meccano Products to value £2-2s.): H. W. Turner, 405, St. Aubyn Street W., Hastings, New Zealand. Second Prize (Meccano Products to value £1-1s.): L. H. G. Bollen, Westerstraat 4, Utrecht, Holland. Third Prize (Meccano Products to value 10/6): Edward Holder, 20, Belmont Circular Road, Port-of-Spain, Trinidad, B.W.I.

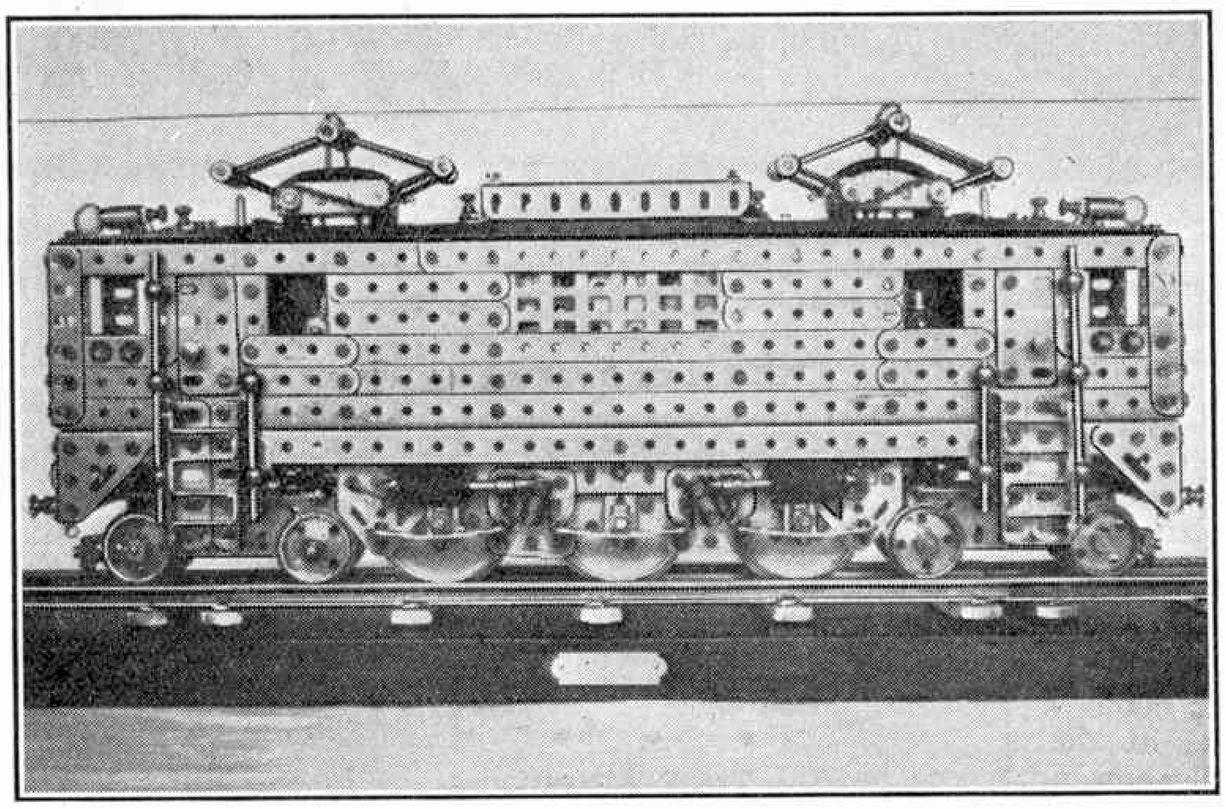
Special Commendation (Certificate of Merit): N. A. Koot, Rotterdam; S. C. Choudhury, Dacca, India; Malcolm Doig, Strathalbyn, S. Australia; M. Tahir, Pegu, Lower Burma, India; G. D. L. Peris, Slave Island, Ceylon; Lim Tam Chong, Kuala Lumpur, F.M.S.

A Fine Electric Loco

An excellent model of a 4–6–4 Electric Locomotive secures first prize in the Overseas "Locomotive" Contest. This is most realistic in appearance, as will be seen from the illustration, and is built as nearly as possible to scale. It weighs 14 lbs. and is designed to run on gauge 1 rails.

The power is derived from two Meccano Electric Motors mounted in the superstructure, the drive being led down to the main wheels by means of three vertical rods rotated through bevel gearing from secondary shafts driven by the motors. The drive is transmitted from the vertical shafts to the axles of the six driving wheels by means of 1½" Contrate Wheels and ¾" Pinions.

The loco is fitted at each end with 4-wheeled bogies attached to the frame by means of double jointed levers, which leave them free to swivel in all directions. A short Threaded Rod secured in a vertical position to the centre of each bogie carries a 1" fixed Pulley, and the centre hole of the latter forms a cup to receive a Meccano Steel Ball. This presses against a Flat Plate in the engine-frame, and thus supports part of the weight of the loco. The load may be distributed evenly over the bogies and driving wheels by adjusting the small Threaded Rods (which are mounted in Threaded Bosses) until the correct pressure against the Flat Plate is obtained.



4–6–4 Electric Locomotive, by H. G. van der Sluis. (Awarded First Prize, Overseas Loco Contest)

An interesting feature of the model consists of an electric brake gear. This is operated from four Meccano Coils each wound with ten layers of No. 26 wire, and connected in series. When the circuit is completed they attract 1½" Rods which slide inside the coils and are connected by means of a portion of a Universal Coupling and an ordinary Coupling to two transverse Rods. A further Coupling is mounted by its centre hole on each of the latter in such a way that, as the magnets are brought into action, their ends press outwards against the circumference of the driving wheels. Small springs (extracted from Spring Buffers) mounted on the sliding 1½" Rods normally hold the brakes in the "off" position.

Combined Adhesion-Rack Loco

The second prize-winning model, sent in by Frank van Bulck, represents an electric locomotive of the type used in certain mountainous railways for combined rack and adhesion working. The rack system is brought into operation automatically as the loco enters a gradient; it consists of 1" Gear Wheels fitted to the chassis and driven by the Meccano Electric Motor mounted in the loco. The Gear Wheels engage with a series of Rack Strips bolted end to end in the centre of the track.

Some idea of the excellent manner in which the model is constructed is shown by the fact that the loco chassis, alone, will climb a gradient of 54 in 100! The loco complete with superstructure and pulling a heavy coach is capable of overcoming an incline equal to 32 in 100.

I hope to illustrate and describe this interesting model more fully in some future issue of the Magazine.

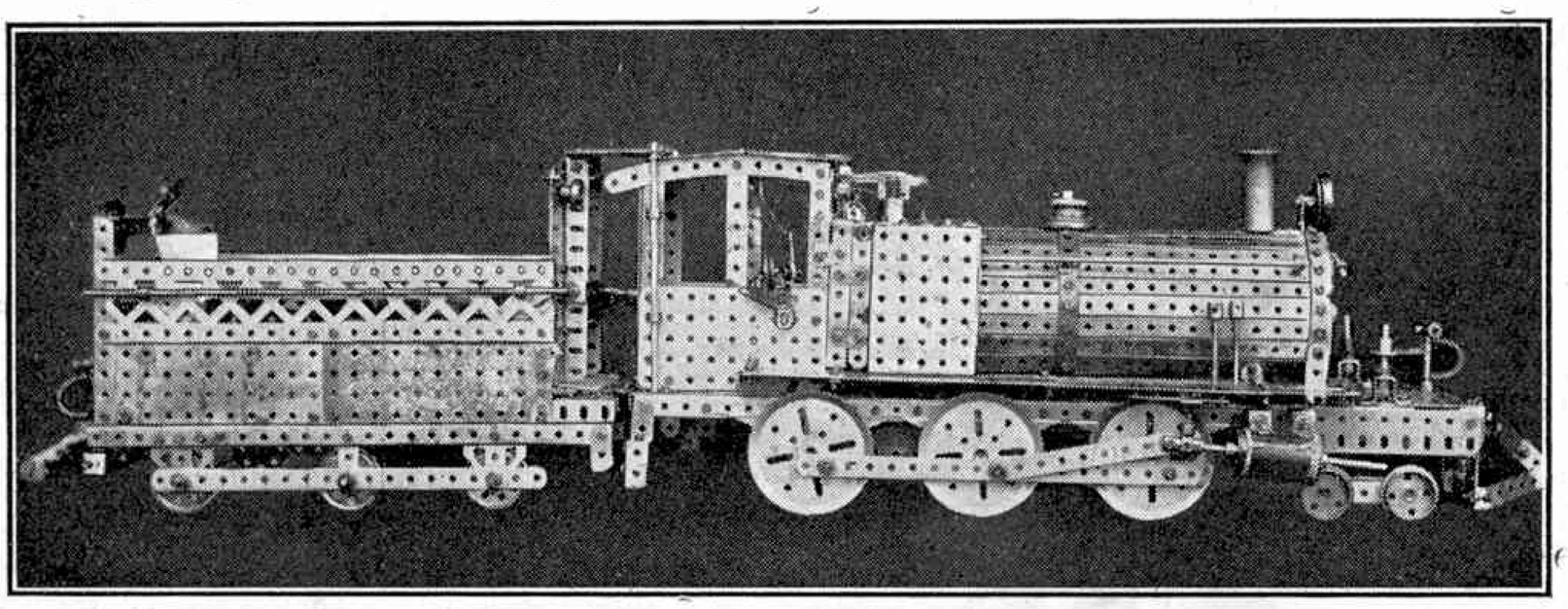
Other Prize-Winning Entries

The third prize has been awarded for a splendid model of a typical Canadian 2–6–2 locomotive. The design in this case is exceptionally good and points to the fact that the builder must possess a sound knowledge of his subject.

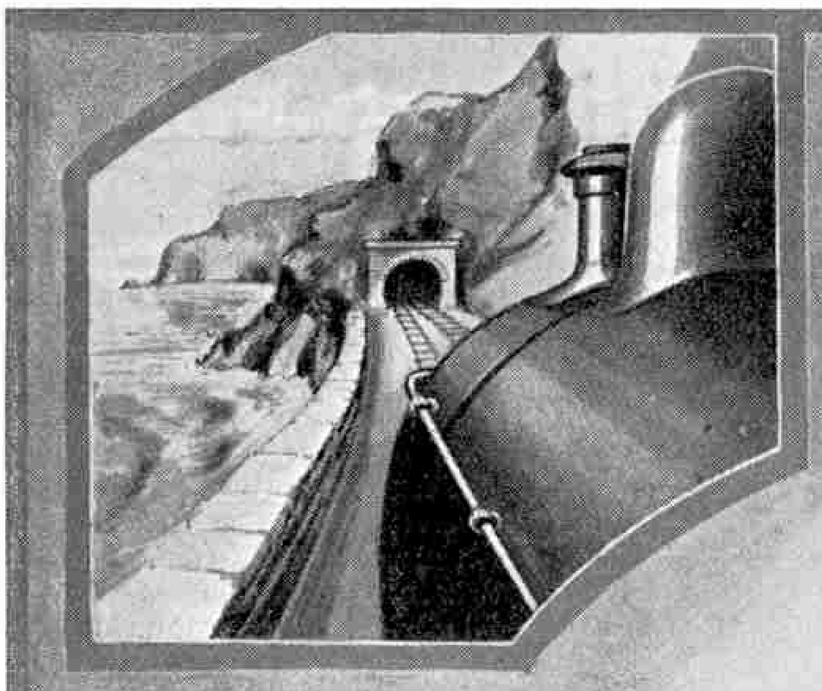
The lower illustration on this page shows an elaborate model of a typical South African loco, submitted by L. W. Creasey. This model was displayed in a local shop, where it aroused much interest. It also appeared in a recent issue of the *Cape Argus*, together with a photograph of its designer.

O Outfit Contest

Some interesting models were received in the Overseas 0 Outfit Competition, and as soon as the necessary space is available I propose to illustrate and describe in the *"M.M."* one or two of the principal prize-winning entries. Meanwhile, I may mention for our readers' interest that the first prize was awarded for a Revolving Crane, sent in by H. W. Turner, who also submitted three other models—a Self-emptying Wheel-barrow, Meccano Acrobat and a Roundabout-See-saw combined with an "Ocean Wave." The second and third prizes were won by L. Bollen and E. Holder respectively. The former submitted a miniature automatic Paper-cutting Machine, in which an old safety-razor blade was employed for the knife, while the latter entered a neat model Pumping Engine.



A Typical South African Loco, by L. W. Creasey. (Another prize-winner in the Overseas Loco Contest)



Railway News of the Month

Traffic Guides

With a view to easing the congestion at the three Charing Cross underground stations, the Underground Railways are experimenting with traffic guides to patrol the subways at these stations during traffic hours. The men have been specially selected for their knowledge of London, and they wear distinctive uniforms, including an armlet comprising the Underground 'bull's eye' sign, with the word 'Guide' underneath.

Charing Cross is the busiest centre on the whole Underground system, 35,000,000 passengers a year being handled at the three stations, a figure that will show a big increase with the completion of the new extensions.

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Railway Radio Concert

A successful broadcasting experiment has been carried out by the Great Western Railway (Bristol) Radio Society, when four specially equipped coaches were attached to the 2.30 train from Bristol for Cardiff. Each compartment in the coaches was fitted with a loud-speaker, of which there were twenty in all, and the Cardiff broadcasting station transmitted a special programme throughout the time during which the train was travelling. The programme was picked up as the train left Bristol and instrumental and vocal items were heard with extreme clarity in all the compartments and corridors.

The experiment was so great a success that the G.W.R. made another attempt last month on the Cornish Riviera Express (Paddington to Penzance). An inside frame aerial was used with a seven valve set. Five loud speakers and 20 double headphones were placed in the dining saloon, but the strength was such that the set was capable of supplying on one train either ten loud speakers and 800 headphones, or 30 loud speakers only!

On the outward journey from London music was picked up from Daventry while the train was travelling at over 70 miles an hour, but there was considerable interference owing to the electric generator beneath the coach.

For the return journey arrangements were made to overcome this difficulty and the results were much more successful. At Plymouth, music from Daventry, 225 miles away, was clearly heard, and during the halts at Newton Abbott and Exeter Paris came in very strongly and the crowds on the station platforms were delighted with the surprise entertainment. As the train travelled onward, Daventry was again picked up and after sunset Aberdeen and Bournemouth were heard with considerable clarity. At Tiverton Junction, "Big Ben" was heard to strike six o'clock, and an hour later, as the train approached Frome, "Big Ben" supplied the seven o'clock dinner gong, the sound being heard all along the train corridor. During the remainder of the journey various other stations were tuned in with remarkable results. The success of this experiment appears to indicate that the installation of wireless for the convenience and entertainment of railway passengers will be a feature of railway travel within the next few years.

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Track Alterations

In view of the track alterations that are to be placed in hand at Cannon Street Station on the Southern Railway, official notice has been given that the use of the station will be discontinued from Saturday, 5th June until Monday, 28th June.

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German Loco Works

In contrast with the German aircraft industry, some facts concerning which are given in our Air News this month, several German firms engaged in the manufacture of railway locomotives are proposing to restrict production and, in some cases, to close down altogether on account of the lack of orders. The State railways already possess nearly 5,000 surplus engines. A large percentage of these are out of date, but numbers of modern locos are available. Over 14,000 coaches also are lying idle and while this huge quantity remains unabsorbed the prospect of orders for new vehicles is very remote.

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L.N.E.R. Report

At the annual general meeting of the London and North Eastern Railway Company held last month, it was stated that during 1925 there was a decrease in traffic receipts of over £1,500,000 and that passenger traffic was responsible for £559,000 of this total. The company carried 5,000,000 fewer passengers, but had run 1,500,000 more passenger train miles than during the previous year, in an attempt to compete with road transport.

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Projected Tube Railway

The construction by private enterprise of a new passenger tube railway under the Tyne between North and South Shields is under consideration. The Corporations of the two boroughs have decided to oppose the scheme, however, since they regard it as being against their interests.

L.M.S. Orders

The London Midland and Scottish Railway have recently issued particulars of the distribution of contracts for 50 new express passenger locomotives, 5,800 goods wagons and 300 steel under-frames. The locomotives have been ordered from the Vulcan Foundry Limited, Newton-le-Willows. Various English and Scottish firms have secured the orders for the rolling stock, which includes 3,000 merchandise wagons, 500 cattle trucks, 2,000 12-ton coal trucks and 300 long rail wagons.

* * * *

New Underground Stations

The Underground Railway have accepted tenders for construction of five stations on the new Morden Tube at South Wimbledon, Colliers Wood, Tooting Broadway, Balham and Trinity Road. The work is scheduled to be completed in six months and there seems to be little doubt that the line will be open to traffic before the end of the summer.

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New South Australian Bridge

In November last a new railway bridge over the Murray River, South Australia, was opened. The bridge is 1,880 ft. in length and is stated to be the second longest in Australia.

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Empire-Grown Timber

Following the L.N.E.R. decision to purchase only British-made steel rails, an order for 26,000,000 cubic ft. of Douglas fir has been passed to the Canadian lumber industry by one of the British railway groups. This marks a departure from a tradition dating back nearly 100 years, for hitherto British railway sleepers have almost invariably been of Baltic Pine.

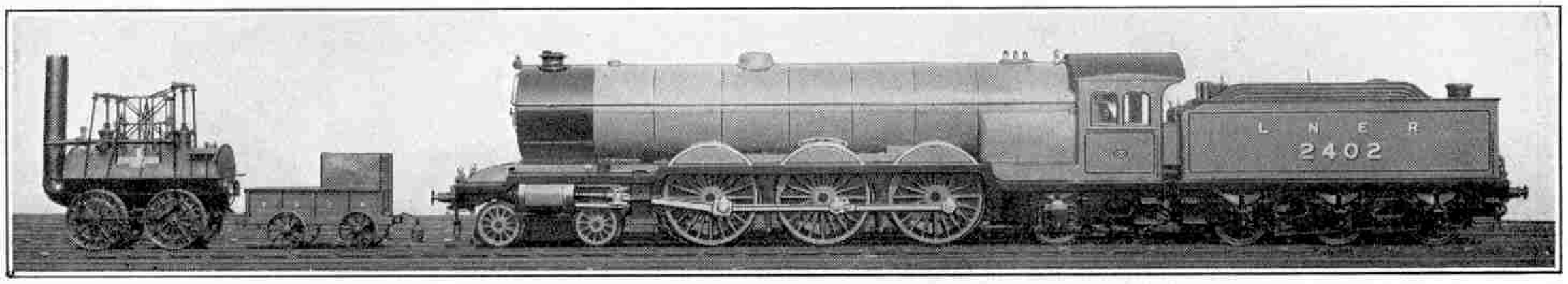
The size of the order may be gauged by the fact that it represents more than the British Columbian export of timber to the United Kingdom for 1923.

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New L.N.E.R. Tank Locos

In the new tank locos recently put into service on the suburban trains of the Great Eastern section of the L.N.E.R. the driver's position is on the left-hand side in accordance with up-to-date practice. The dimensions of these locos are such that, like those on the Great Northern section, they may be used for the Metropolitan Railway.

Past and Present: Two Famous Locos



"*Locomotion No. 1*," the first loco to run on the Stockton and Darlington Railway (1825) and L.N.E.R. Pacific Loco—2402, "*City of York*" (1925), one of the latest express passenger engines

Garratt Locos for India

Messrs. Beyer, Peacock & Co., have recently given delivery of the two Garratt 2-8-8-2 locos for the Bengal-Nagpur Railway, 5 ft. 6 in. gauge. These locos are to work on the heavy section between Chakardarpur and Jharsuguda, the average gradient of which is 1 in 100, and will haul loads of from 1,500 to 1,600 tons.

* * * *

Railway Birthday

The Mersey Railway, running under the River Mersey between Liverpool and Birkenhead, recently celebrated its 40th birthday, and it is interesting to observe some of the details of its progress. The line was officially opened for traffic by the late King Edward VII., on 20th January, 1886, and regular running of the trains commenced in the following month. Originally steam trains were employed and the service was limited to a total of 30 journeys per day through the tunnel. To-day the electric trains make 450 to 500 journeys per day. It is estimated that nearly 500,000,000 passengers have used the route, but owing to through bookings on the adjoining G.W. and L.M.S. lines it is not possible to give the exact figures.

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Engineering Feat on S.R.

Towards the end of January an interesting engineering feat was successfully accomplished at Cannon Street Station, in connection with the electrification scheme. A huge iron girder had to be placed in position in the bridge over the Thames to permit the re-arrangement of the lines crossing the bridge. The work was commenced on the evening of 15th January and carried on in shifts by over 100 men, with the aid of acetylene flares, in the midst of falling snow.

The girder, 140 ft. long and weighing 72 tons, was moved into place, ready for pivoting and dropping to its final resting point, by two 36-ton cranes. On the night of the 16th the task was to lower the girder a distance of 11 ft. into its final position on the distributing girders that bear its weight. First one end, and then the other, was gradually lowered, extreme care being taken to prevent too rapid a descent. Packing had been placed underneath the girder and this was removed bit by bit until the distributing girders were reached.

The work was completed at midnight and the tracks were quickly restored to permit the ordinary steam traffic time-table to be worked at its full programme.

New Southern Locos

The ten new "River" class locos at present being built at the Southern Railway Company's Brighton Works are expected to be ready for service in June. They are numbered from 800 to 809 and bear the names of the following rivers :— "*Cray*," "*Darenth*," "*Cuckmere*," "*Itchen*," "*Tamar*," "*Camel*," "*Torridge*," "*Axe*," "*Char*" and "*Dart*."

* * * *

A Long Engine Run

Many railways in the United States are adopting the policy of making one loco do the work that a few years ago was considered to require two or three locos.

Loco No. 6157, of the Chicago, Milwaukee, and St. Paul Railway, made a splendid run recently in hauling a train consisting of 13 steel passenger cars over the entire distance of 805 miles from Chicago to Mobridge, South Dakota, without being detached from the train.

No. 6157 is an ordinary standard type "Pacific" loco with cylinders 25 in. by 28 in. and 79 in. driving wheels. The grate area is 59 sq. ft., the steam pressure 200 lb., and the tractive effort 37,658 lb. In regular service this loco and another of the same class haul 12 to 15 steel passenger cars between Chicago and Minneapolis, a distance of 421 miles.

* * * *

South African Developments

As most of our readers know, the railways in South Africa are owned by the Union Government, which appears to be tackling transportation problems in a progressive spirit. In 1910 the country was served by 7,500 miles of line, but to-day that figure has grown to 12,500 miles. Recently the Government has been authorised to proceed with the construction of another 1,000 miles of line to open up some of the practically virgin agricultural and industrial tracts in different parts of the Union.

The Natal main line, an exceedingly busy line carrying a big export traffic in coal and agricultural products, has been electrified over a stretch of 300 miles. In the Cape Peninsula steady progress is being made with the electrification of the suburban services.

The engine power and rolling stock is being improved in various parts of the country in preparation for the improvement of trade that must inevitably follow the internal developments now being pushed forward.

Another Railway Record

The year 1925 will be noteworthy in British railway history, for not a single passenger was killed in an accident. This record has only been equalled in two years, 1901 and 1908, since 1850.

* * * *

Water Columns

Our readers may have noticed that occasionally the L.M.S. depart from their usual custom of painting water columns and tanks black, and instead paint some yellow and a few red. The explanation is that the supply from the red tanks must not be used except in cases of extreme necessity. This restriction may be due to various causes, such as the supply being unsuitable or the column being placed in such a position that locos standing by it cause delay. The columns passed prior to reaching a red one are painted yellow as a warning to drivers to fill up and not postpone the operation until they reach a red column.

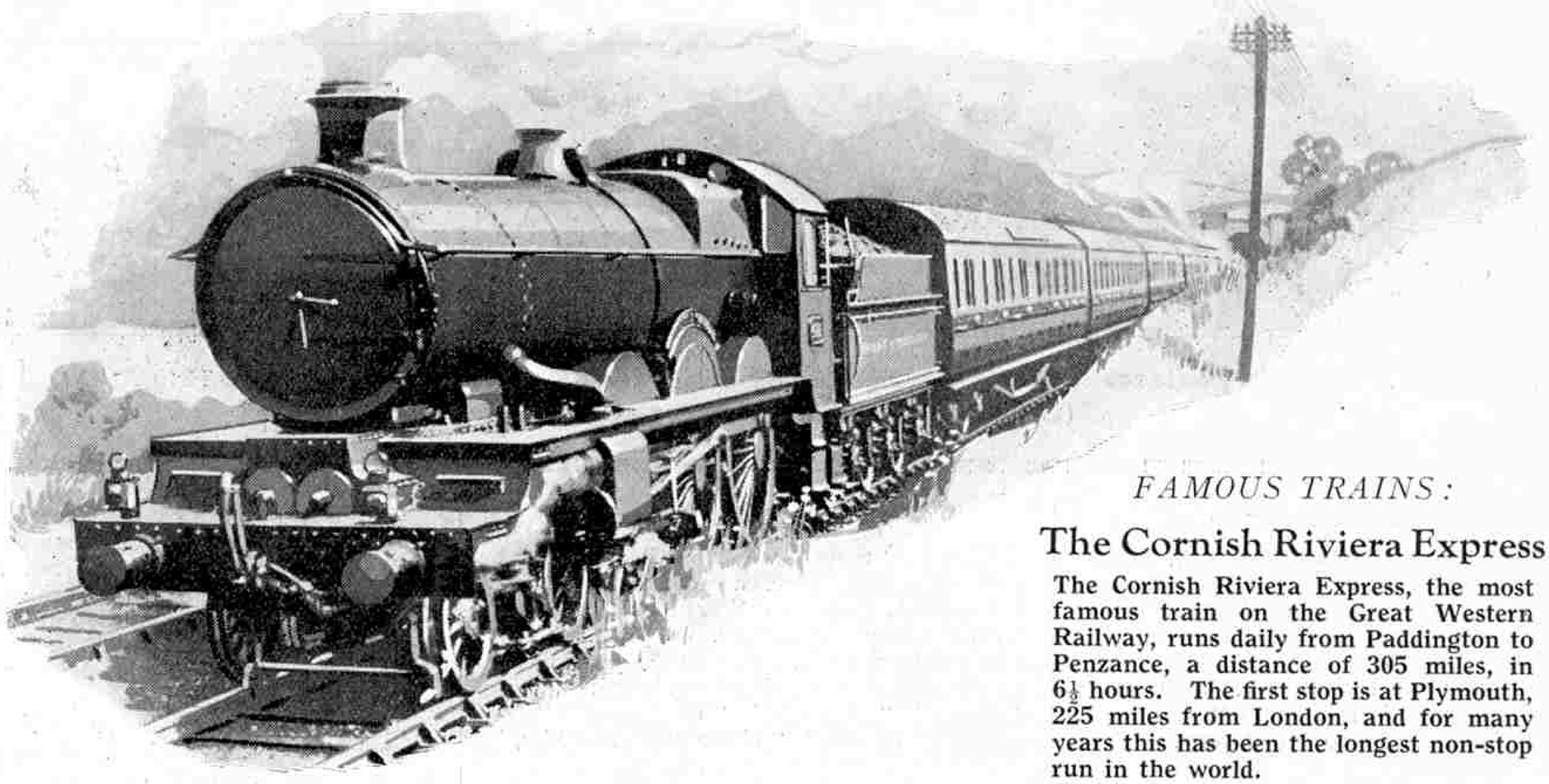
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Longer American Rails

Another step towards improvement in railway operations in the United States is indicated by the announcement of the American Railways Association that new specifications have been approved in accordance with which the length of rails will be increased to 40 ft. This is an increase of 6 ft. as compared with the rails now in use, but the weight per yard remains unaltered.

This increase in length will effect a marked saving, not only in the cost of installation of new rails, but also in track maintenance charges. For instance, there will be a reduction of 16 per cent. in the number of rail joints and a similar saving on bolts, nuts, joint-bars and screw-washers, used in connecting the rails. The reduction in the number of joints should have the effect of reducing the liability to accident, for it has been clearly shown that a large number of the rail breaks, due to wear and depreciation in rails, appear at the joints. In addition, the increase of length will make for smoother running, since the number of shocks due to passing over joints will be reduced.

It is interesting to note that the Americans have not yet reached the standard of rail construction attained in Great Britain, where 45 ft. rails are common on the main lines. Indeed, several years ago the old London and North Western Railway Company adopted 60 ft. as their standard, and it is only the higher price demanded by manufacturers that has deterred other companies from following this lead.



FAMOUS TRAINS:

The Cornish Riviera Express

The Cornish Riviera Express, the most famous train on the Great Western Railway, runs daily from Paddington to Penzance, a distance of 305 miles, in 6½ hours. The first stop is at Plymouth, 225 miles from London, and for many years this has been the longest non-stop run in the world.

HORNBY CLOCK WORK TRAINS

BRITISH AND GUARANTEED

Real trains are made of steel and then painted in their correct colours—so are Hornby Trains.

Real trains pull heavy loads over long distances—so do Hornby Trains.

Real trains are not scrapped when one part goes wrong or gets broken. They are sent to the repair shops and a new part is fitted. The same thing happens if you break any part of a Hornby Train.

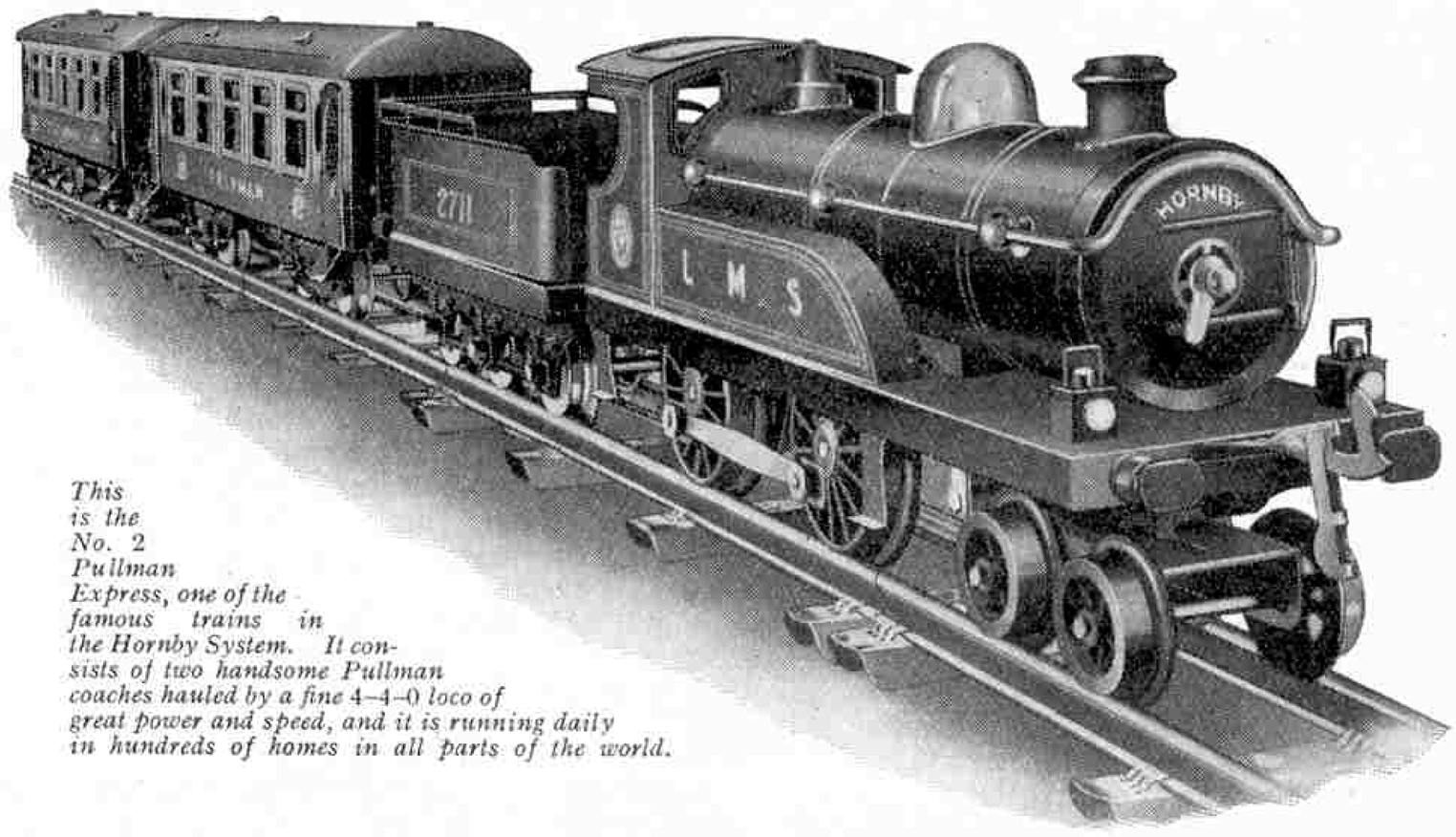
Real railways don't consist of only a locomotive and a couple of carriages. There are stations, signals, goods wagons, points, level-crossings, loading gauges, breakdown vans, snow ploughs. All these and many other accessories are included in the Hornby series.

Real trains don't run round and round a circular track all day, neither do Hornby Trains. You can build up a REAL railway system in miniature—complete to the smallest detail—if you like. That's why Hornby Trains are such good fun—they're so real that you don't just play at trains—YOU OWN AND RUN A REAL RAILWAY.

PRICES

No. 0 Passenger Set	...	**24/–**
No. 0 Goods Set ...	...	**17/6**
No. 1 Passenger Set	...	**27/6**
No. 1 Goods Set ...	...	**21/–**
No. 2 Pullman Set	...	**60/–**
No. 2 Goods Set ...	...	**37/6**
No. 1 Tank Goods Set	...	**25/–**
No. 2 Tank Goods Set	...	**45/–**
No. 2 Tank Passenger Set		**45/–**

Ask your dealer to show you the Hornby Trains

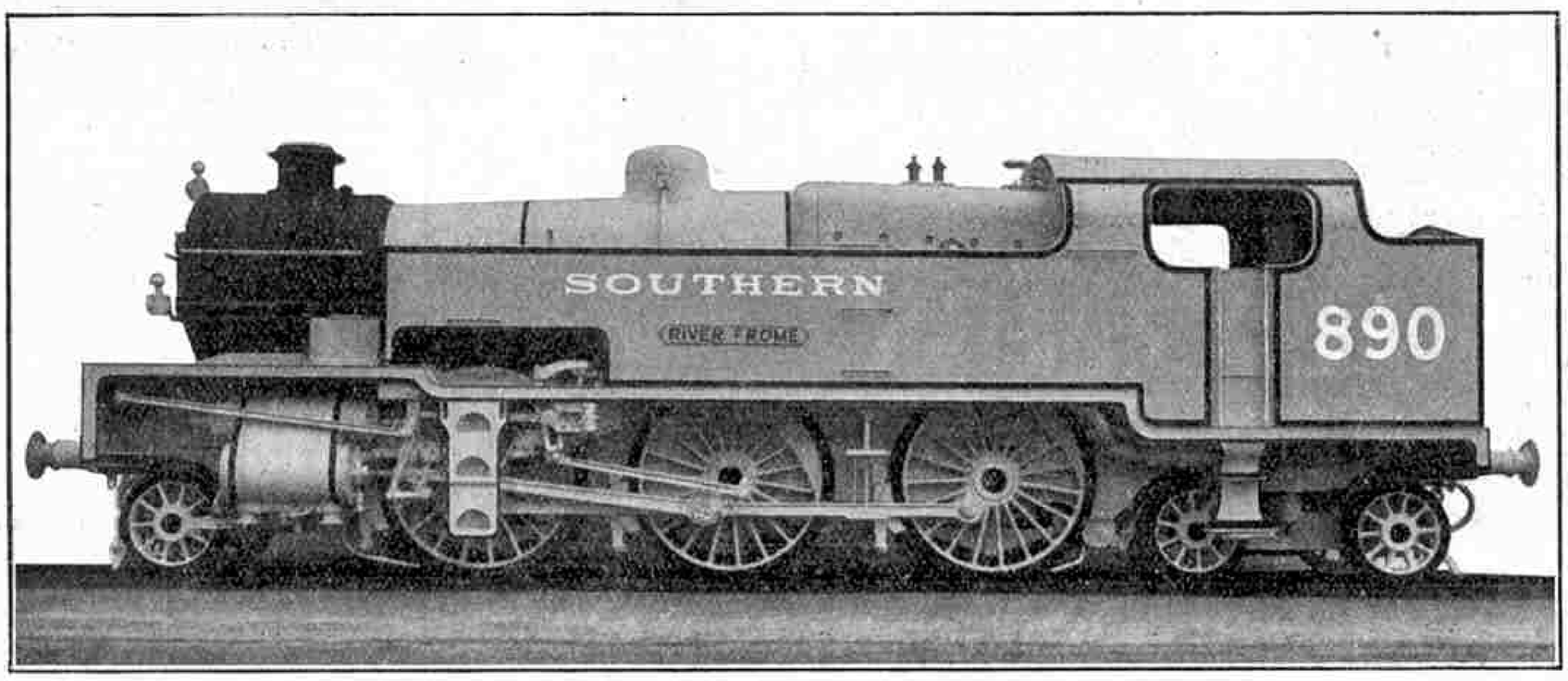


This is the No. 2 Pullman Express, one of the famous trains in the Hornby System. It consists of two handsome Pullman coaches hauled by a fine 4–4–0 loco of great power and speed, and it is running daily in hundreds of homes in all parts of the world.

MANUFACTURED BY **MECCANO LIMITED, Binns Rd., LIVERPOOL**

A Three-cylinder Tank Loco

First of Ten New 2-6-4 Locos for the Southern Railway



Courtesy] **The New 2-6-4 Tank Loco "*River Frome*"** *[Southern Railway*

Early in 1923, one of a batch of 2–6–0 tender engines for the Southern Railway was built with three cylinders instead of two. Similarly, one of ten 2–6–4 type superheater tank engines to the design of Mr. R. E. L. Maunsell, the Chief Mechanical Engineer, has now been built at Ashford Works, with three cylinders, 16 in. diameter by 28 in. stroke.

The cylinders and motion are interchangeable with the 2–6–0 three-cylinder engine No. 822, whilst the boiler, wheels, and other details are identical with those of the two-cylinder tank engines.

The arrangement of valve gear, as before, consists of two Walschaerts gears for the valves of the outside cylinders. Rocking levers, connected to the outside gears through extension rods, operate the valve of the inside cylinder.

The single-throw crank axle is of the built-up type with extended webs to form counter-weights. These balance the crank pin and part of the connecting rod, so that the same wheel centre castings as used for the two-cylinder engines can be utilised by a little adjustment to the balance weights, making for greater inter-changeability.

The inside connecting rod is of the strap bolt pattern, while the outside rods are of the plain bushed type.

The engine is numbered A890 and has been named "*River Frome.*" It has, as far as possible, been made identical with the two-cylinder engines of the "River" class at present working on the Southern Railway, with the object of comparing three and two-cylinder simple engines both as regards performance and cost of maintenance in passenger service.

The accompanying table gives an interesting comparison of the dimensions and weights.

Details of Southern Railway Three-Cylinder and Two-Cylinder Tank Locos.

	Three Cylinder.	Two Cylinder.
BOILER.		
Working Pressure	200lb. per sq. in.	200lb. per sq. in.
Barrel diameter out., front	4⅞in. dia. ×9/16in. thick	4⅞in. dia. ×9/16in. thick
Barrel diameter out., at firebox	5ft. 3in. dia. ×⅝in. thick	5ft. 3in. dia. ×⅝in. thick
Barrel length	12ft. 6in.	12ft. 6in.
Firebox shell—width	4ft. 0½in.	4ft. 0½in.
Firebox shell—length	8ft. 0in.	8ft. 0in.
Tubes 1¾in. out. diameter	175	175
Tubes 5⅛in. out. diameter	21	21
Heating Surface—Firebox	135 sq. ft.	135 sq. ft.
Tubes	1,390.6 sq. ft.	1,390.6 sq. ft.
Total	1,525.6 sq. ft.	1,525.6 sq. ft.
SUPERHEATER (21 elements)	285 sq. ft. (inside)	285 sq. ft. (inside)
GRATE AREA	25 sq. ft.	25 sq. ft.
CYLINDERS.		
Number	3	2
Size	16in. dia. ×28in. stroke	19in. dia. ×28in. stroke
Piston Valves	8in. dia.	10in. dia.
Travel (maximum)	5¾in.	6 7/16in.
WHEELS.		
Front Bogie (Bissel)	3ft. 1in. dia.	3ft. 1in. dia.
Coupled	6ft. 0in. dia.	6ft. 0in. dia.
Trailing Bogie	3ft. 1in. dia.	3ft. 1in. dia.
TRACTIVE EFFORT (at 85 per cent. boiler pressure)	11.34 tons	10.65 tons
TOTAL WEIGHT OF ENGINE in working order	88 tons 15 cwts.	82 tons 12 cwts.
TOTAL WEIGHT ON COUPLED WHEELS	56 tons 15 cwts.	52 tons 15 cwts.
TANK CAPACITY.		
Water	2,000 gallons	2,000 gallons
Coal	2½ tons	2½ tons

Fast G.W. Run

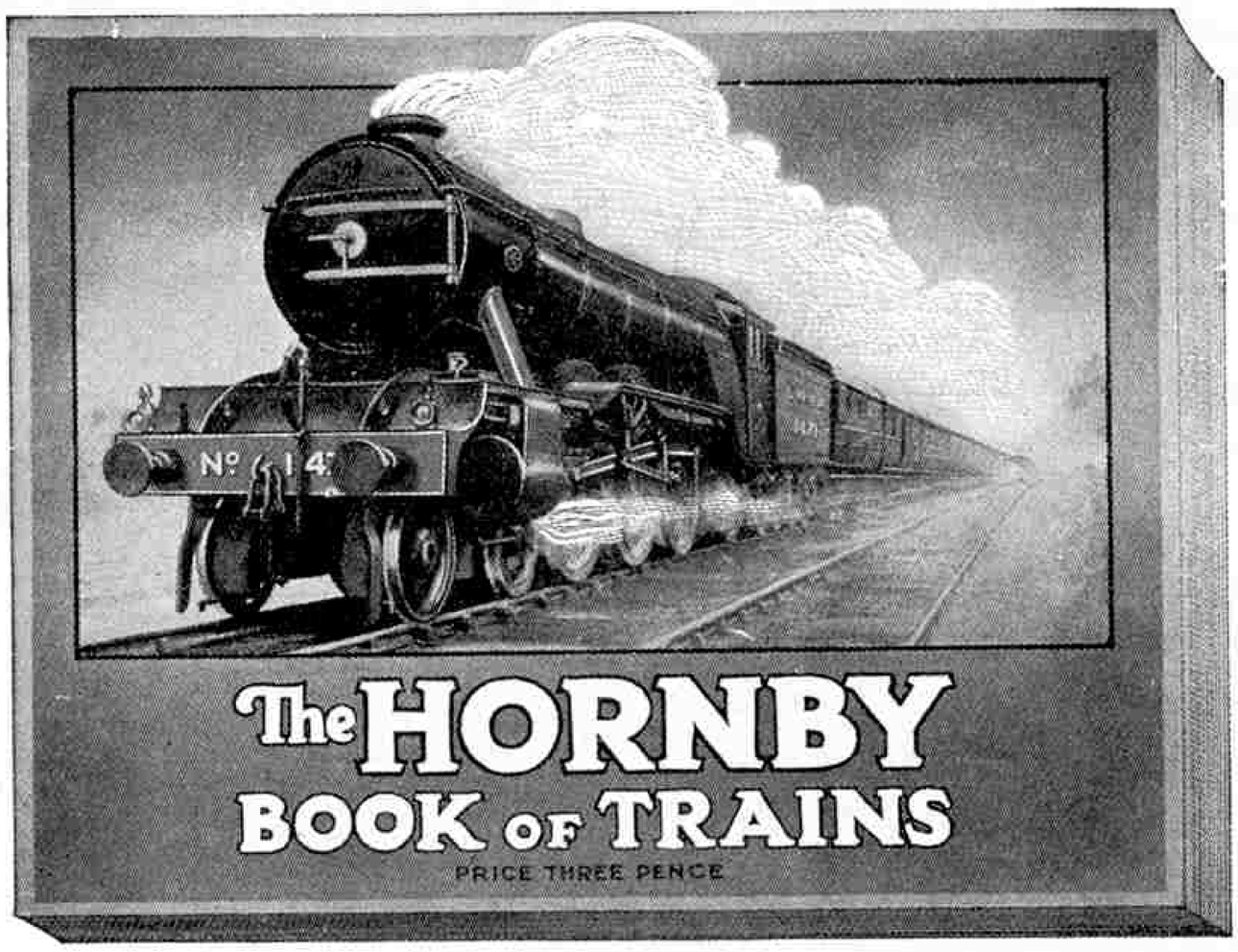
An exceptionally fast run was made recently by a Great Western "Castle" class loco with passengers disembarked from a liner at Plymouth. The journey from North Road Station, Plymouth, and Paddington, a distance of 226 miles, was covered in 3 hours 54 minutes, start to stop, at an average speed throughout of 58 m.p.h. Between Westbury and London the average speed was as high as 64.8 m.p.h. for 95½ miles continuous travelling.

L.N.E.R. Statistics

Some idea of the extent to which the L.N.E.R. serves the population of Great Britain is afforded by some recently issued statistics. There are in Great Britain 92 towns (exclusive of London) of over 50,000 inhabitants, their aggregate population reaching 10,500,000. Of this population 80 per cent. is served by the L.N.E.R. The company has a route mileage of 7,000, owns 2,500 stations and goods depots, 38 docks with 38 miles of quays, and employs some 224,000 individuals.

New Rhodesian Railway

The construction of a railway from the Rhodesian main line south of Gwelo to Shabain, to serve the important asbestos industry in the latter district, is under consideration. At present practically all the transport from the Shabain district to the railway, sixty miles distant, is by ox wagon. The Government also intend to construct a bridge for rail and road traffic over the Limpopo at Messina. The completion of this project will link up main line traffic with Natal and the Rand,



New Edition Now Ready

So great has been the demand for this splendid publication "*The Hornby Book of Trains*" that several editions have had to be printed and already over 130,000 copies have been sold.

In response to requests from many new readers of the "*M.M.*," who did not see the original announcements and who therefore were not able to order a copy of "*The Hornby Book of Trains*," we have printed a final edition, which is now ready. Any reader who has not already had a copy of this fine book should order without delay, as no further copies of this edition will be printed.

The "*Hornby Book of Trains*" is a splendid production in every way, and no effort has been spared to make the publication worthy of the name it bears. It consists of 44 pages (11" × 8¼") of special art paper and on the cover, illustrated above, is a magnificent reproduction in colour of the L.N.E.R. "*Flying Scotsman*" at speed, which is well worth framing.

What the Book Contains

The first half of the book is devoted to the story of the locomotive from its earliest days, dating to before the time of the opening of the first passenger line.

The following are the chief sections :—

The Development of Iron Rails
The Stockton and Darlington Railway
The First Railway Companies
The Classification of Locos
Early Steam Locomotives
The Liverpool and Manchester Railway
Development of the Passenger Carriage
Famous Trains

The second half of the book includes a beautifully illustrated description of all the Hornby Trains and the latest Hornby Series Rolling Stock and Accessories. These illustrations are printed in four colours and the reproduction of the Hornby Trains is most realistic.

Address your orders to "Hornby Book," Meccano Limited, Binns Road, Liverpool, and please write your name and address clearly. The book will be posted to you by return of post.

The price of the book is 3d. (post free) which may be sent in stamps. There is no reduction if more than one copy is ordered.

Orders from Overseas

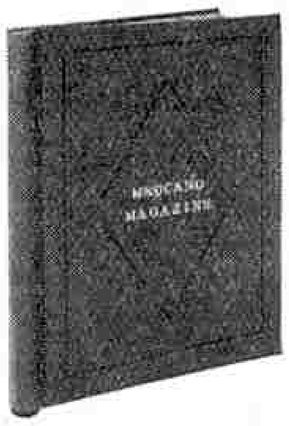
There is a special edition of "*The Hornby Book of Trains*" for Overseas readers. Readers overseas should address their orders to our Overseas agencies as below.

AUSTRALIA : Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
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The price for all orders from outside the United Kingdom is 6d. per copy, post free.

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There i no better way of keeping your Magazines clean and tidy than by binding them in the special binder we supply for this purpose.

This binder has a strong stiff back, and holds a large number of copies. Covered in black imitation leather, tastefully tooled, lettered gold, its price is 3/- post free, from Meccano Ltd., Binns Road, Liverpool.

OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

F. F. Harrison (Sunderland).—There are numbers of Meccano boys in Sunderland, Frank, and you should have no difficulty in starting a Meccano Club. We have already sent you some helpful literature. Let us know how you progress.

A. E. Jackson (York).—The rule of the road in regard to passing vehicles on the right, or off-side, applies to all vehicles except tramcars, which should be passed on the inside. In passing a tram, however, care must be taken that no passengers are about to alight from it or about to cross the road to board it.

R. L. Wilkinson (Brisbane, Aus.)—We were interested in hearing all about the "*Century Fire*," the single engined boat that established the world's record of 72 m.p.h., and of her remarkable accident this year, when she hit a floating bottle which broke a blade of her propeller, compelling her to retire from the race. Thanks for photo of "*Miss America*."

M. E. Myers (New Lambton).—We are pleased to know all about the hobbies you like best, and we congratulate you on winning two prizes in a month. Thanks for snapshot of motor car racing-track accident. It was indeed a dreadful affair.

R. Garcia (San Juan, Trinidad).—San Juan must be a very beautiful place judging by your description. Lots of English people go out to your city for a holiday now to enjoy your climate and scenery. Thank you for your congratulations—we too wish we could shake hands with you.

G. S. Dobson (Barrow-in-Furness).—Your nearest broadcasting station is Manchester, from whence it would not be possible to receive telephony on a Crystal Set.

G. Seaborn (Moose Jaw, Sask.)—Thanks for your graphic description of the train wreck close to your home. We could follow it quite clearly from your diagram. We are always glad to hear from you.

C. Hastewell (Rhos-on-Sea).—Both station and coaches look much better of course when fitted with electric lights, and we congratulate you on so successfully electrifying your system. It sounds a good idea to have Christmas oftener, but before finally deciding, ask your father and mother and let us know their views!

D. Hartnell (Bundaberg, Aus.)—Thanks for your interesting letter and photo of yourself. You appear to be leading a healthy and happy life. An expert swimmer, able to drive your father's car, and Meccano and Hornby Trains as indoor hobbies, is not bad for a boy of thirteen.

C. M. Cockin (York).—We are really very sorry Charles, and we will try our hardest not to use split infinitives in the "*M.M.*" in future. We will also have more competitions for lynx-eyed readers. There is always an index of the main features on the last page of each number of the "*M.M.*"

D. Thorp (Port Stanley, Ont.)—Thank you for sending us a long newspaper account of the engineering successes of Mr. R. L. Dunsmore. It is gratifying to know that he commenced his career by building Meccano models.

K. Yoshida (Tokyo).—Your letters always give us pleasure. We hope "M. le Counsul-General du Japon" has returned safely from Mukden and joined his boys again. We note your wish for another big model competition and we are considering the matter.

D. F. Waddington (Bristol).—We are very glad to know that you have constructed a Receiving Set from Meccano parts. Possibly with an outside aerial, you may be able to receive broadcast from Cardiff, but at that distance reception with an indoor aerial will be doubtful.

C. Webb (Hove).—"It is a great joy to me to see the boys working out their own ideas in connection with the Meccano Club, and I congratulate you on putting before them such an admirable and instructive pastime as Meccano." We are always very glad to see parents take such a keen interest in their boy's activities and we trust that with your help Roy will be able to place his club on a sound basis.

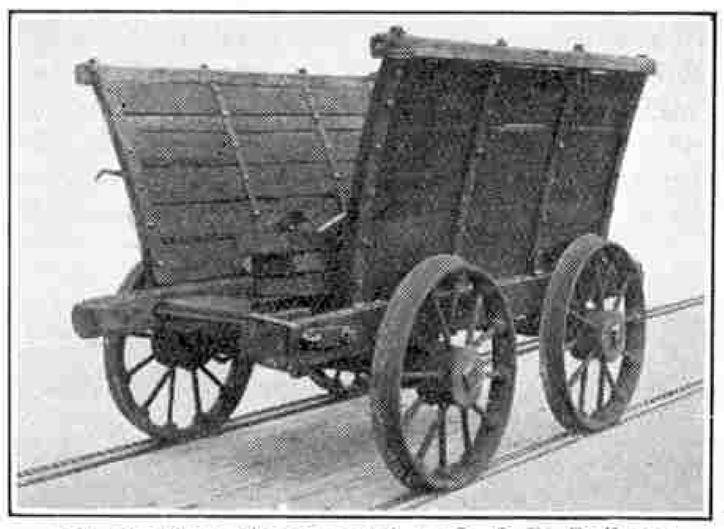
G. Howard (Dunedin, N.Z.)—We were very glad to hear from you again and to know about the Dunedin Exhibition, but you have only described the pleasure side of it. Tell us all about the exhibits and if possible send us some good photographs. We will try to find you a suitable French correspondent.

Railway Comfort 100 Years Ago

The Development of the Passenger Carriage

IT is a far cry from the early railway carriages—more closely resembling bathing machines than passenger vehicles—to the luxurious Pullmans of to-day, but the story of the evolution is one of gradual progression and improvement, exactly as it was in the case of the locomotive itself.

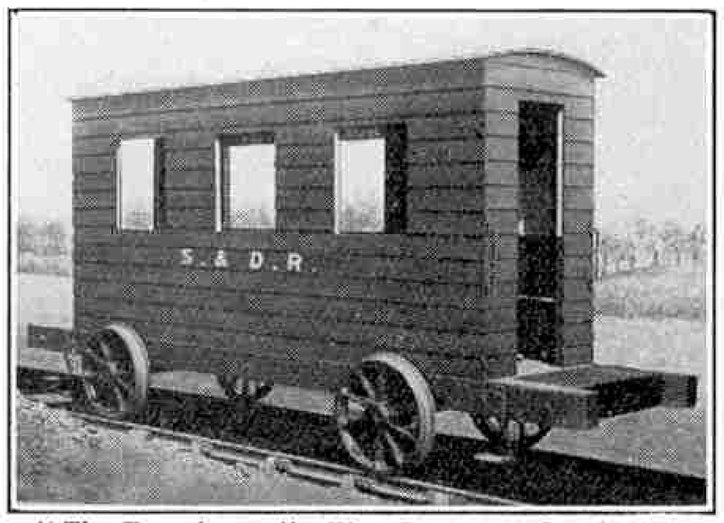
The first railways were not built with the idea of carrying passengers—they were introduced for the transport of coal, passenger traffic being only a secondary consideration. Ultimately, of course, passenger traffic became of greater importance than the transport of coal, and as a result more attention had necessarily to be paid to the question of comfortable accommodation.



Old Chaldron Wagon used on S. & D. Railway

The First Passenger Coach

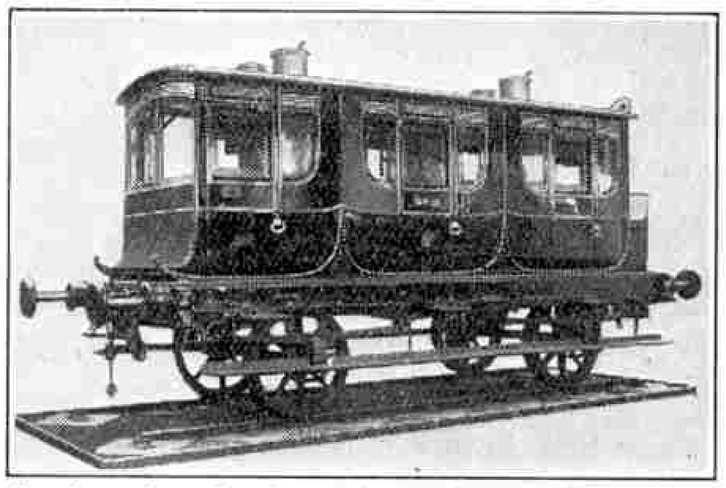
On that historic day, a hundred years ago, when the Stockton and Darlington Railway was opened, a passenger coach, to accommodate the directors and their friends, was included in the train. There were also twenty-one chaldron wagons for other passengers in addition to twelve loaded wagons. "The signal being given," said a witness of the scene, "the engine started off with this immense train of carriages."



"The Experiment"—First Passenger Coach (1825)

Those of us who were fortunate enough to witness the Centenary procession at Darlington in July last, saw an exact copy of this early coach in the replica train that took part in the historic celebrations.

This first railway coach was designed by George Stephenson and was very properly named the "*Experiment.*" It was little more than a box on four wheels, but it served the purpose of showing that passengers could be carried successfully by rail. By the time the Liverpool and Manchester line was opened the passenger vehicles had improved a good deal. They were then practically stage coaches on railway wheels, and from early illustrations it may be seen how close was the resemblance. At this time, many people travelled on the railway in their own private carriages that were run on to flat trucks, and so made certain of a comfortable and well-sprung seat!



Coach used on London—Birmingham Railway (1842)

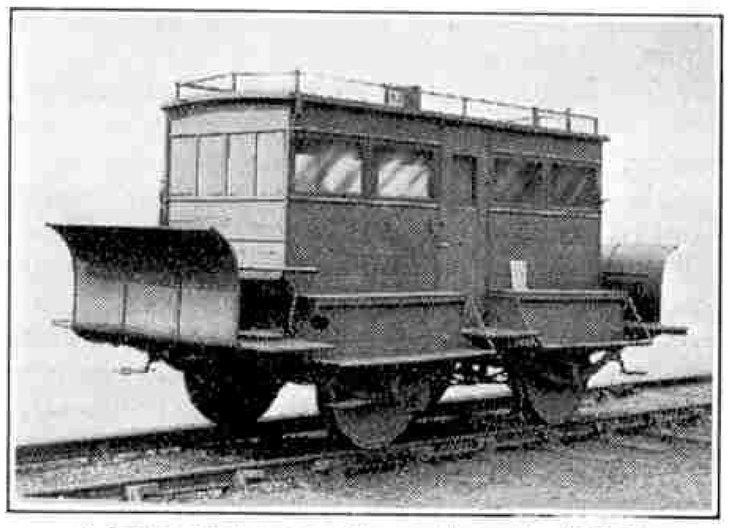
In these early stage coach vehicles there were usually three compartments, one first-class in the centre and a second-class at each end. Luggage was placed on the roof and the guard also was given a seat at the end of one of the carriage-tops.

Carriages Without Windows

Third-class passengers received very little consideration. At first they travelled in open trucks, and even when these trucks gave place to so-called carriages no attempt was made to make the vehicles comfortable. Windows were only fitted in the doors, and the seats were of plain wood without any upholstery.

We can readily understand that in these circumstances cartoonists and humorous writers of those days found much material in the unfortunate third-class passenger and his rough and ready treatment!

Passenger traffic grew with surprising rapidity on all the important lines and gradually longer carriages with more comfortable fittings were introduced. After a while it was found that the length could not be increased further if the coaches were to negotiate curves with safety, and this resulted in the introduction from America of bogie trucks by means of which coaches of great length could ride easily round curves.



A horse-drawn carriage used on the N.B.R.

First Dining Cars

Dining cars were adopted by the Great Northern Railway in 1879 but the trains were not then fitted with corridors and vestibules. Incidentally the meals were cooked before the train began its journey and were kept as hot as was possible until the meal hour!

The credit for the first corridor express with dining cars attached must be given to the old L.N.W.R. which ran a well-fitted express daily from Euston to Scotland.

Pullman cars were introduced from America by the Midland Railway in 1875, and that company also took the drastic step of abolishing second-class carriages and making every train available for third-class passengers.

The first Pullmans were very successful. It was found that these smooth-riding cars were the safest portion of the train and this fact led

(*Continued on page* 257)

Initiating Mr. Smithers

This is a story, reprinted by permission from "*The Electrical Review*," of a young electrical engineer who "came and went," deciding that the life of an electrical engineer is not such an easy one as some people seem to believe.—*Editor*.

I WAS just considering the question of packing-up for the day when the bell summoned me to the Manager's office. As I wended my way there I cast about in my mind for any technical omissions I might have made recently, for, as a rule, a summons to the Chief meant but one thing—that there was "something up." I had hastily gone through a mental review of two recent jobs by the time I had reached the sanctum, and as I opened the door I began to marshal the facts relating to another job that was not quite so favourable.

My trend of thought was completely upset, however, by the unusual aspect of my Chief, whose customary highly-critical demeanour was conspicuous by its absence. His gaze, usually of an e.h.p. quality and directed point-blank at the arriving victim, was unexpectedly mild, and it was lingering upon someone else. The latter was a young fellow, who (remarkably enough) appeared perfectly at ease. Indeed, a chance onlooker would have identified him as the most impressive character in the room.

"Oh—er, Davis," said the Chief, turning to me. "This is Mr. Smithers, who is joining us for an insight into—our er—work. I'd like you to take him along with you to-morrow and initiate him. He might as well be getting on with these four jobs."

* * * *

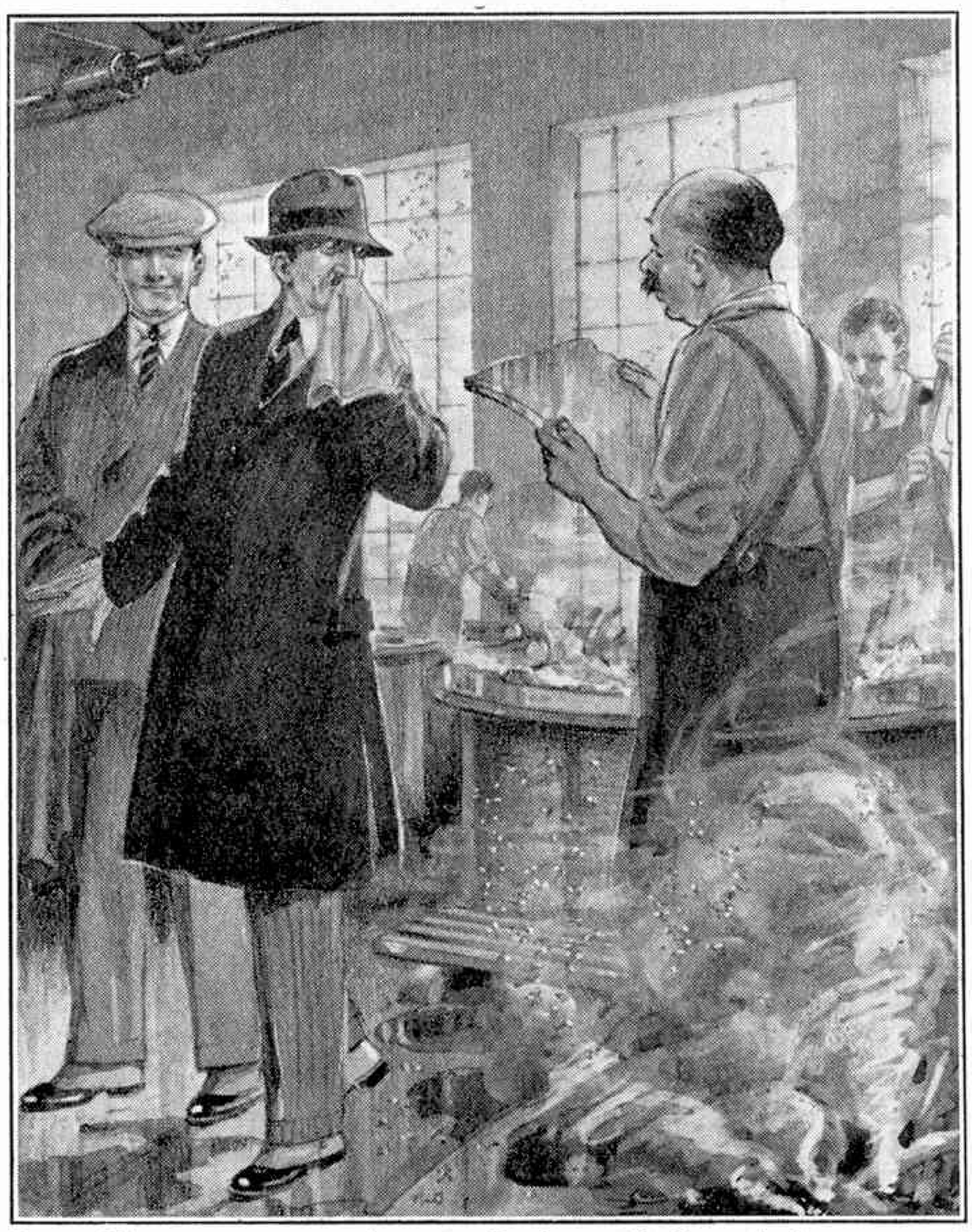
On the following morning I had some difficulty in locating the latest arrival, but eventually found him, in a state of abstraction, behind "*The Wireless World*." He appeared somewhat taken aback and, to my relief, not quite as impressive as on our first meeting.

After an exchange of "Good mornings!" and as he did not seem inclined to forsake his wireless paper, I remarked, "We'd better be getting along"—at which he made a move. "By the way," I went on, "I wouldn't advise you to wear such good togs on our work. The jobs to-day, for instance, are a bit rough-and-ready, so to speak."

"Oh, that's all right," Smithers hastened to assure me. "I know what electrical work is like."

During our run in the car to the first place I gathered that Smithers, after leaving college with a technical degree, had found some difficulty in adapting himself to the practical world. Yes, electrical work appealed to him. He seemed, though, to be under the illusion that the life of an electrical engineer was a perpetual round of glorified lab. work.

Our first halting-place was in the nature of a rude awakening, however, for it was a flock factory. Here a number of carts were unloading sackfuls of rags, which were first placed in ovens. Inside the factory proper were a number of machines looking very much like a.c. generators, the rotors, however, bearing nasty-looking spikes. Into these machines the rags were fed, to emerge from the tearing process as flock. They were driven by electric motors, and, as I explained to Smithers, our job was to investigate the electrical conditions following on the installation of some static condensers.



"... If ever you want a good piece of glue, just you come along here!"

Smithers seemed to be in no mood for technical matters, however, and as time went on his interest decreased to zero. This was understandable, and due to a detail which I have neglected to mention. The atmosphere of the factory was stiflingly hot, and full of tiny, irritating fragments of flock. These had filled all the crevices in the walls, and every article in the place bore deep layers of flock—the Supply Co.'s meters and cables being especially favoured. Smithers' discomfort impelled him to retire from the scene, coughing and itching. Having arrived at my power-factor and other details I, too, hastened to leave. Smithers was conversing with the foreman. "Been long here?" said the latter, with a hearty and fluffy laugh. "Lor' bless yer, yes—a matter o' fourteen years!"

For some miles Smithers was silent but still restless. At last he enquired as to our destination. I told him we were now bound for a soap and candle works, and tried to comfort him by assuring him that there was no reason to expect an atmosphere like that at the flock factory. This was not altogether accurate, perhaps, because the atmosphere we presently entered more than made up in aroma for what it lacked in solid matter.

Our technical work here dealt with the metering. The works were on a day-and-night tariff, and as the day meter had gone on strike and the night meter was working a 24-hour shift, the works was receiving all energy at the cheaper rate.

When the fault was located and we reached the fresh air, Smithers expressed the view that it was a wonder *anything* worked in such a place as that! "Besides," he added, with some indignation, "what do people want with candles nowadays? Soap I suppose we need, but candles . . . !"

When he heard that the next job was down a pit he cheered up surprisingly. I hinted that we should have some work to do—as a matter of fact we had more than I bargained for!

At the pithead we met the electrician and had a long and cold wait while a "set" of tubs were hauled to the bank. I donned overalls and cap, while Smithers elected to retain his overcoat in lieu of dungarees.

The banksman signalled to us to get into the cage. . . . The cage dropped and Smithers gasped! The shaft was a wet one, and water splashed on to the cage in streams. Smithers's overcoat was not so out of place after all!

At the bottom we paused awhile to attune ourselves to the new surroundings, the onsetter meanwhile regarding Smithers's trilby and overcoat with frank amazement! Then, burdened with current transformers, instruments and lamps, we set off inbye—the electrician leading the way. For a while we clambered and splashed over tramlines in a main road. The roof lowered, and abruptly we turned to the right, down a steep incline. Bent nearly double, and half-slithering, half-walking, I managed to keep in sight of the electrician. Behind me I could hear Smithers stumbling along. I was per-

spiring freely and did not envy him in his overcoat!

The electrician halted. We had reached our objective—a wet and dimly-lighted pumphouse. Here was a pump driven by a 60 h.p. electric motor, the working conditions of which were to be investigated. Smithers was exhausted and sad, and, I am afraid, was not of much help. I do not think he was able to reconcile his ideas of electrical engineering to the crude actuality.

At length our investigations were duly completed, in spite of water and bad light and Smithers's wilting state. After a hard climb back to the shaft-bottom, and another wet journey to bank, we were once more on the surface, and on our way to the last job.

Smithers seemed to be thinking hard, and at last volunteered the statement that he would never again criticise miners! After another spell of thought he went on to admit (frankly, if ingenuously) that electrical engineering was not what he had expected. When I gently made the inevitable rejoinder he hesitated, and his answer, beginning with a floundering attack upon his technical education, ended by a confession of his keen interest in wireless. (No wonder he had, earlier in the day, been so contemptuous of our local frequency of a mere 50 cycles!) He was commencing a description of his latest "super-het" when the increasing flavour of the air informed me that our last destination (a glue factory) was near at hand.

Smithers was visibly reluctant to enter the place, but during a breather in the office he must have pulled himself together, for when I appeared with the engineer he followed us without apparent hesitation.

The technical trouble here lay in the fact that the normal maximum demand had suddenly risen. The engineer's ideas anent his hourly maximum demand were hazy—as often is the case. Having examined the demand indicator and found it in order, by some judicious inquiries we elicited the real cause—the gelatine section of their factory, long dis-used, had been opened again.

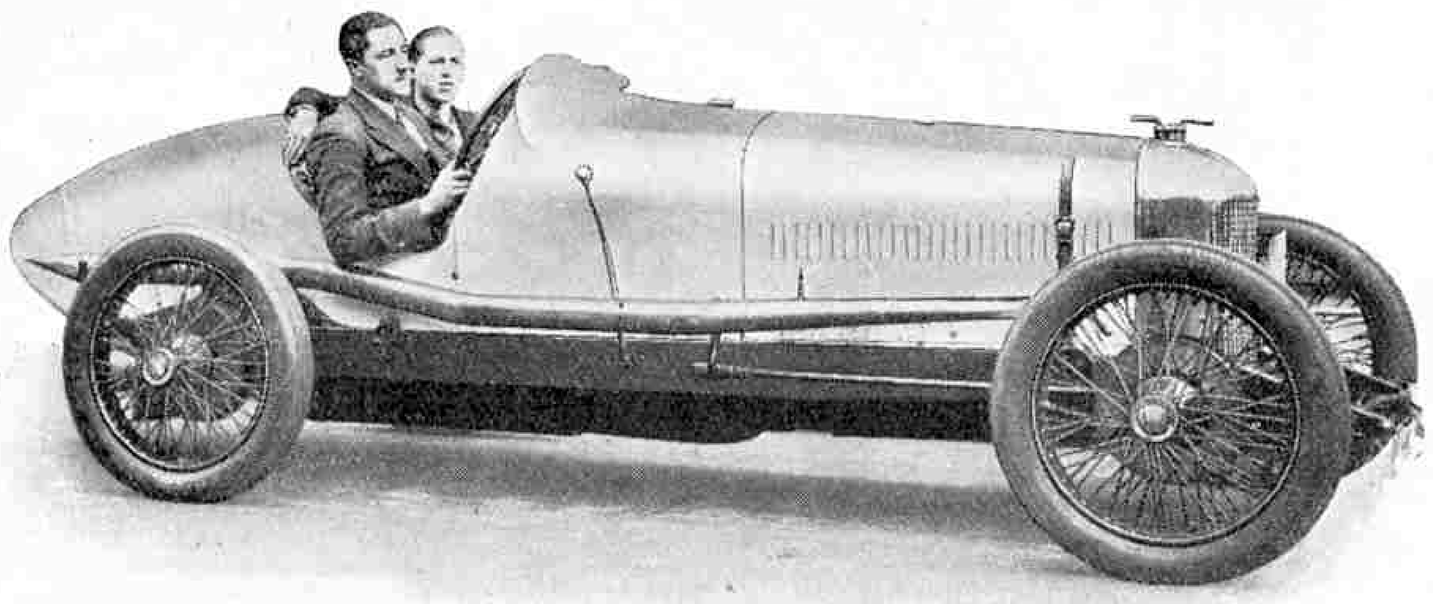
Our wanderings took us through an atmosphere hot and stinking. At one place we passed a mysterious tank around which a dense crowd of big flies were busy. Hides, skins, and bones were being melted in open boilers, and the glue-stock boiled in water. In wooden congealing boxes the gelatinous fluid formed into stiff jelly, after which it was cut up and dried. All these interesting operations were marred by the abominable stench. Smithers looked sick and I hastened to depart. The foreman, with an air of pride, showed us a sample sheet of glue, and explained how the beautiful polish was obtained by re-dipping in water and again drying. "A fine bit of stuff," he said, passing his hand lovingly across it. "If ever you want a good piece of glue, sir, just you come along here!" At this Smithers fairly shot out of the place.

On our homeward journey he contented himself with a large number of abnormally deep breaths, and his "good night" was uttered in rather dejected tones. I forebore to press him for an opinion of his day's experience but saw him next morning engaged in a confab. with the Chief, after which he disappeared and "our place" knew him no more. Later in the day the Chief announced briefly that "Young Smithers is not continuing with us."

* * * *

Whom should I meet in town a week later but Smithers himself! He appeared supremely satisfied with existence and his greeting, whilst a trifle lordly, was tinged with a certain respect—perhaps he admired my courage in professionally penetrating into noxious regions. He was now, it appeared, with a radio engineer and "doing well." I congratulated him on dropping into a more congenial sphere and, as we parted, told him that there was one thing he need never want. He looked puzzled. Then I reminded him of the kind offer of the glue factory foreman: "If ever you want a good piece of glue, just you come along here." Smithers's face paled, a shudder passed over him, and he hurried away!

120 Miles an Hour!



Those of our readers who are keen on motor racing will be interested in the above illustration of the well-known racing car, the "Miller 'eight.'"

This car, which is capable of well over 120 m.p.h., was built in America at a cost of £3,000. After being raced there it was purchased by that famous motorist Count Louis Zborowski, but the Count, unfortunately, never had an opportunity of really testing the car, being killed while racing last year.

The car now belongs to Mr. D. Higgin, of Liverpool, and in his hands has gained many local successes. At a recent meeting of the Southport Motor Club, for instance, held on the Southport sands, the "Miller" swept the board, obtaining five firsts and one second out of six races, as well as leading all the way in the 10-mile race until the last lap, when it caught fire. Fortunately the fire was extinguished before any serious damage was done, but the car was unable to finish.

The "Miller" has a straight-eight engine of 1886 c.c. and is fitted with four carburettors and Remy ignition system.

Railway Comfort 100 Years Ago—

(*Continued from page* 255)

directly to the adoption of much heavier coaches on most of our main lines.

Many of the long-distance expresses to-day have Pullman cars attached, and for a small additional charge both first-class and third-class passengers may travel in these luxuriously-fitted vehicles. Pullman carriages are the property of the Pullman Car Company, and run on the various railways by arrangement.

Sleeping cars were first used in America and consisted of large vehicles the seating arrangements in which could be easily adapted for night use. In this country they were first used on the West Coast route in 1873.

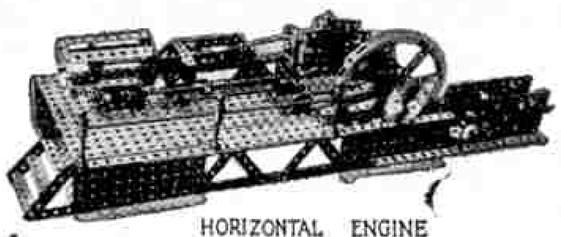
In the old days very little consideration was given to the lighting of railway coaches. As the number of passengers increased, however, it became necessary to have some regular system of lighting, and oil lamps were introduced. From the accounts of passengers in those days these lamps were evil-smelling affairs giving a miserably poor light. The next step was the introduction of oil gas with flat flame burners. This improved matters considerably, but a really efficient light was not obtained until the introduction of the incandescent burner which is still largely used.

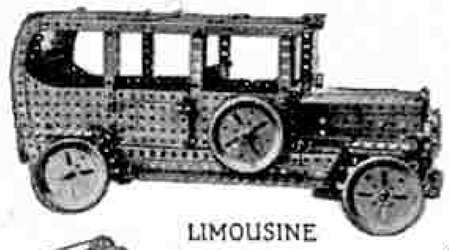
Incandescent lighting has certain disadvantages, however, the chief of which is danger from fire, and on account of this danger the present-day tendency is to abolish gas entirely and to light trains throughout by electricity. On electrified railways the current for lighting purposes exists already, but on steam-driven trains a small dynamo is fitted beneath each coach and driven from one of the bogie axles. In order to maintain the light when the train is at a standstill, or running too slowly for the dynamo to generate sufficient current, an accumulator battery is provided and this is charged by the dynamo during the periods in which the train is travelling at 25 miles per hour or more.

The Prince as a Fretworker

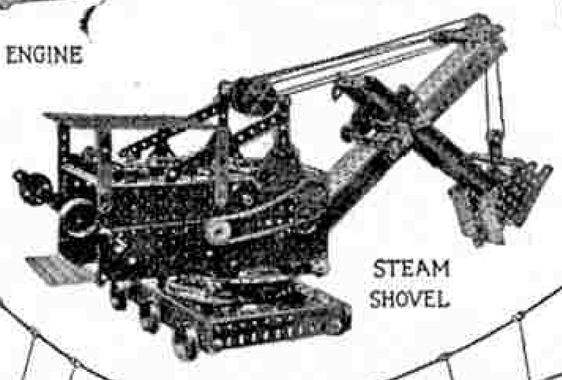
It is interesting to note that during an informal visit to the British Industries Fair the Prince of Wales paid a visit to the stand of Messrs. Hobbies Ltd., in the Toy Section. H.R.H. was attracted by the Fretwork model of the Quebec Bridge, and also displayed much interest in the Model Launches that were running in a tank of water with realistic effect. In his usual thorough-going manner, the Prince noticed the latest O.K. Fret Machine produced by Hobbies, and was not satisfied until he had treadled it. The manner in which he accomplished this proved that he had had previous experience, due we learn, to being the possessor in his early days of one of Hobbies Fretwork Machines. The high quality and excellent appearance and finish of the tools and various appliances on the Stand came in for remark by His Royal Highness, who also chatted with the assistants in charge of the Stand before he departed.


PIT HEAD GEAR

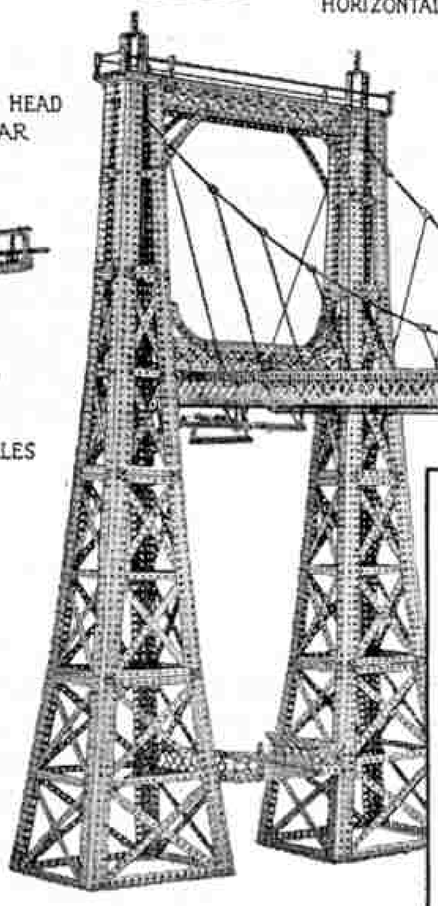

HORIZONTAL ENGINE


LIMOUSINE


CRANE


STEAM SHOVEL


PLATFORM SCALES


TRANSPORTER BRIDGE


FIRE ESCAPE


SEARCHLIGHT

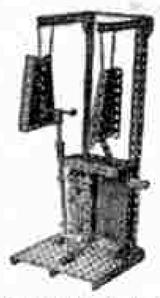
MECCANO

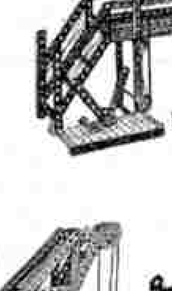
is always new. It brings a new interest into your life from the start. You become at once an engineer, a builder, an electrician, an architect, a motor mechanic, an airman, a weaver, and a shipwright.

Through the long winter evenings it teaches you to solve intricate problems, and to think *constructively*. Whilst giving you endless hours of pleasure, it is the while training eye and hand and brain—all the time keeping them tuned up and fitting them for whatever career you may adopt later in life.

MECCANO IS ENGINEERING FOR BOYS


TIP WAGON

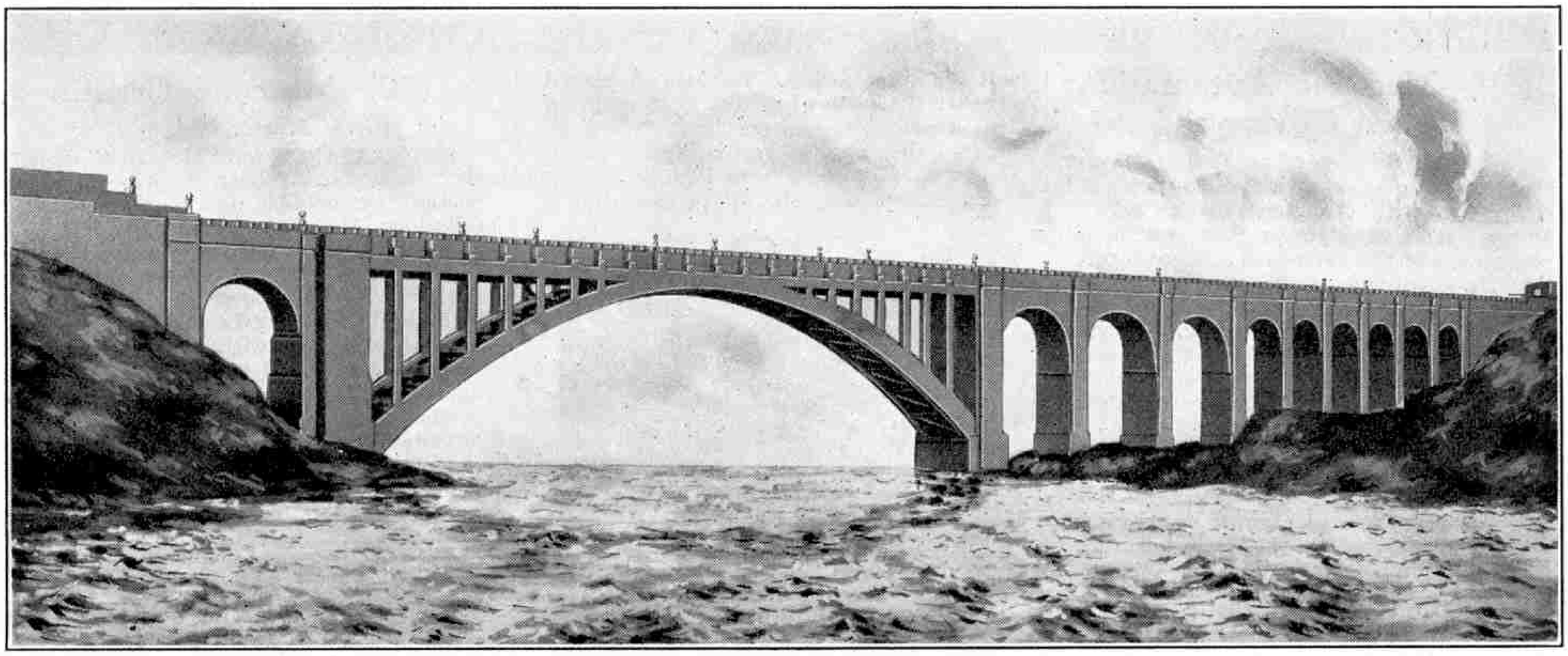

AUTOMATIC GONG


TOWER WAGON

FAMOUS BRIDGES—No. 9

RE-MODELLING A BRIDGE

Clearing the Channel of the Harlem River for Navigation



High Bridge, New York, as it will appear when the masonry pillars are removed and the cantilever is substituted

IT will be remembered that in our August issue reference was made to the fact that High Bridge, New York, had been pronounced a menace to navigation and that plans were being considered for its reconstruction, as it was not desired to lose the bridge entirely.

For many years a hot controversy has raged round this bridge. One party advocated the demolition of the bridge on the grounds that it served no practical purpose and took up space of which better use could be made, that it was unsafe and that the masonry was crumbling away. The opposition fought for the retention of the bridge on account of its historical associations and its architectural beauty.

A happy compromise has been effected at last, however, by the decision to re-model the existing bridge in such a manner as to conform to the order issued by the War Department and yet at the same time retain part of the original structure.

The Municipal Art Commission has approved a plan for this work by which nine of the original arches on the Bronx side will be retained, while a steel cantilever arch spanning the entire stream will replace the arches and four stone pillars resting on the bed of Harlem River. This new arch will have a span of 420 ft. and a rise of 103 ft., leaving an unobstructed waterway.

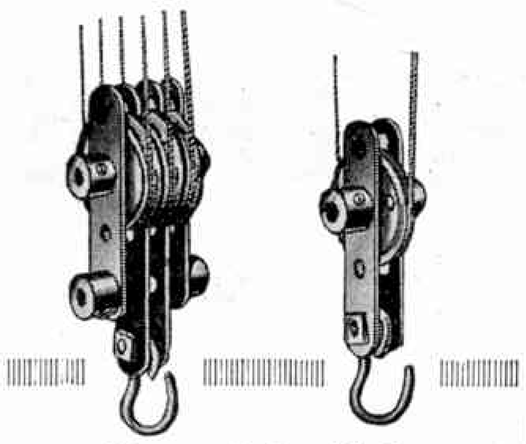
In its new form the bridge will be a combination of a Roman aqueduct and a modern cantilever bridge. It might be thought that such a combination would be unsatisfactory from an artistic point of view, but this will not be the case. The combination will harmonise well with the architecture of the city as a whole, and in addition the design will blend well with that of the adjoining Washington Bridge.

It may be mentioned that such combinations of old and new styles of architecture are by no means a novelty in New York where old structures have had to be modified in order to render them capable of fulfilling modern requirements. Foreign architects visiting New York frequently express surprise at this blending of old and new, but in most cases they admit that the result is effective and frequently impressive.

High Bridge, as mentioned in our August issue, was built in 1848 as part of the old Croton Aqueduct, and carries three mains with a water-carrying capacity of 90,000,000 gallons of water per day. This volume of water forms quite an important percentage of the city's supply, and as this could not be dispensed with, even for a few days, the reconstruction of the bridge will be carried out in such a manner that the flow of water through the aqueduct will not be interrupted at any time.

The final plans have given great satisfaction to the citizens of New York. In addition to retaining a good portion of the old bridge, of which they are very proud, a great saving has been effected. If the bridge had had to be entirely demolished—in itself an expensive operation—it would have been necessary, in order to secure the city's water supply, to drive a tunnel under the river to carry the water that now flows in the aqueduct on the top of the bridge. The actual saving is estimated at about £200,000, a very considerable sum even to a great city like New York.

(*Continued on page* 266)



Meccano Pulley Blocks

Suggestions Section

Edited by "Spanner"

(29)—Meccano Automatic Speed Governor

Fig. 29 shows a speed regulating device that may be used with advantage in connection with the Meccano Clockwork Motor. It is based upon the centrifugal principle, and the apparatus is so arranged that the revolving weights, tending to fly outward, are brought to bear upon the inner surface of a Wheel Flange, the friction so produced checking the speed of the Motor. Incidentally, this type of governor is similar to that already fitted to Meccano Clockwork Motors and Hornby Trains, although built on a much larger scale.

Actual tests carried out with the governor fitted to a Clockwork Motor yield varying results, since the period during which a Motor will continue to operate at a single winding largely depends upon the amount of service that it has given, for a Meccano Clockwork Motor will run longer and more freely after it has been in use for some time. However, it is safe to say that the governor will increase the running time of the Motor by 25% or 33⅓% with very little waste of power. The advantages obtainable from such an arrangement applied to any model where it is desired to overcome a tendency to "race" are obvious.

Details of Construction

Its construction is quite simple, as will be seen. A Bush Wheel 1 (Figs. 29 and 29a) is secured to a shaft 2, which is driven from the main Motor spindle by means of the 57-teeth Gear Wheel and ½" Pinion shown. Two 1½" Strips 3 are mounted on Pivot Bolts secured in opposite holes of the Bush Wheel, and are spaced at the correct distance from the wheel by means of a Collar (without set screw) and Washer placed on each bolt.

The weights consist of two ½" Pulleys 5 secured by their set-screws to the shanks of $\frac{5}{16}$" Bolts passed through the outer ends of the Strips 3, sufficient play being allowed to permit of their free rotation.

When stationary, the 1½" Strips are drawn together by a small piece of Spring Cord 4 (Fig. 29a) secured to the centre of each by a nut and bolt. A Wheel Flange 6, bolted to a Bush Wheel mounted on a shaft 7, is placed in position so that its flange encompasses the weights 5. The shaft 7 is held rigidly in position by the set-screw of a Crank 8, which may be bolted to any suitable framework 9. Washers are placed beneath the heads of the two bolts securing the Wheel Flange to the Bush Wheel, to prevent their shanks protruding too far in the interior of the Wheel Flange.

On the speed of the Motor exceeding a certain limit, the centrifugal force exerted by the weights 5 overcomes the Spring Cord 4 and the Pulleys move outward until they make contact with the inner surface of the Wheel Flange 6. This results in the retarding effect already mentioned.

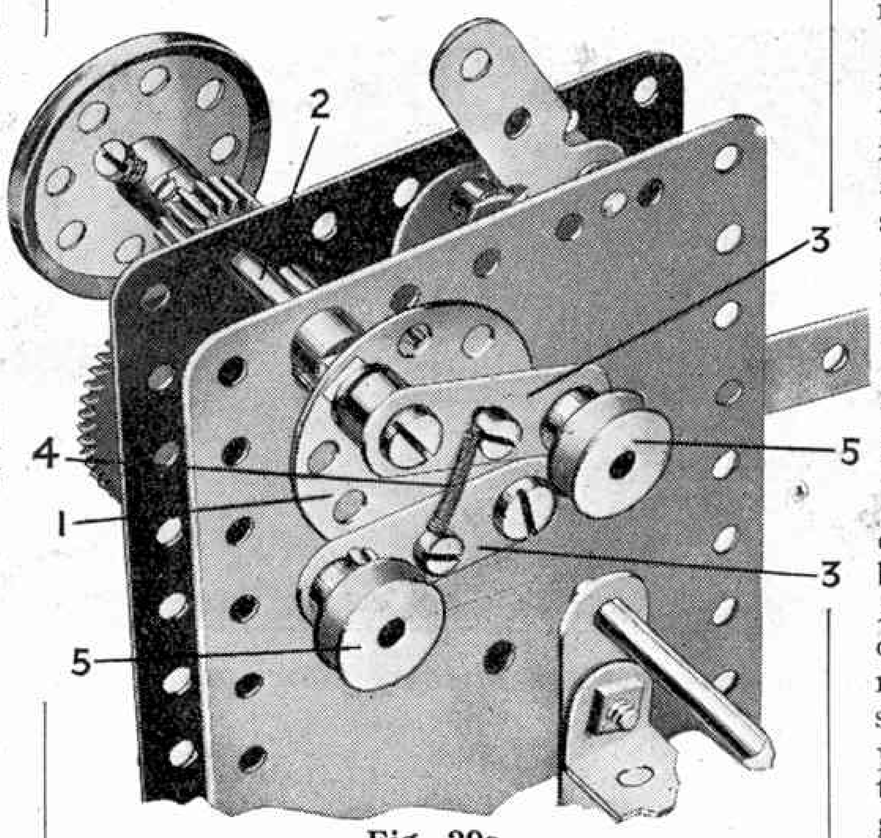


Fig. 29a

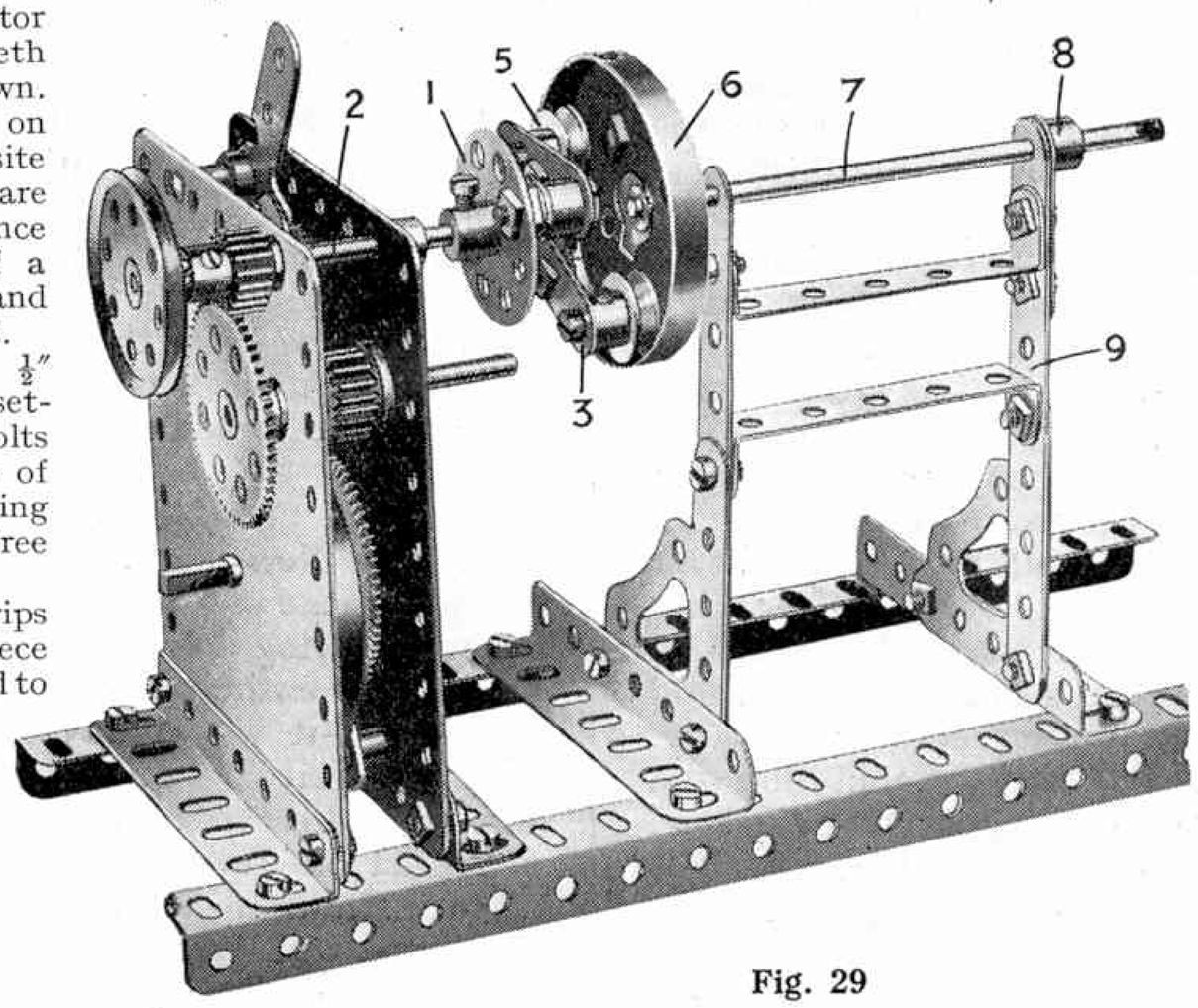


Fig. 29

(30)—Meccano Cramp

(G. S. Marsh, Blackpool)

Further to the several Meccano "tools" that have already been described in this Section, we are able now to reproduce an ingenious Meccano Cramp (Fig. 30).

Our contributor used this device in connection with Meccano model-building as well as for fretwork purposes. For example, in building the Stiff-Leg Derrick, he was able to dispense with the necessity of screwing the model to a wooden base by anchoring it to the edge of a table with two of these cramps. Again, often it is found advantageous to secure portions of a large model during construction to the table or bench at which one is working, and this is another purpose for which the cramp will be found extremely useful.

The model consists of a Threaded Rod (1) engaging the bore of a Threaded Crank (2) bolted to a 2½" × 1½" Double Angle Strip 3. A Threaded Boss 4 is mounted on the end of the Rod 1 and locked in position by a nut 5. A 1½" Contrate Wheel, with set-screw removed, is inserted on the small portion of the Threaded Rod protruding through the Boss 4; the teeth of the wheel grip the bench when the Threaded Rod is rotated. A second Threaded Crank 6, bolted to a 2½" Strip to form a handle, is mounted on the other end of the Threaded Rod 1, and is locked in position by a nut on either side.

For heavier work, it may be found advisable to substitute a frame built up from short Angle Girders in place of the Double Angle Strip, for a more secure grip could then be obtained.

(31)—Brake Attachment for Hornby Rails

(H. R. Hadden, West Moors, Dorset, and J. Hardy, Burnley)

Two competitors have submitted suggestions for a simple brake-rail for use with Hornby Trains. It consists of an Angle Bracket loosely bolted to the hole in the centre of one of the rail sleepers (Fig. 31).

The Angle Bracket should be bolted with its longest arm in a vertical position, ready to engage the small projecting lever on the Hornby loco which brings the brake into operation. The train may be allowed to pass unaffected by turning the bracket sideways—that is, with its edge towards the locomotive.

Our contributors claim that the chief advantage to be obtained from this idea is the fact that it may be fixed easily and quickly in any desired position in the layout, such as before points, signals, platforms, etc. A few trials should be carried out to test the efficiency of the attachment and it will probably be found that improved working is obtained by bending the bracket so that it presents an obtuse angle to the locomotive.

(32)—Automatic Train Indicator

(L. Driscoll and D. Currie, Manchester)

We have received from the above contributors two similar suggestions for an arrangement by which a station-bell, fog-signal, or like device, may be set in motion, or lamps lit, when a Hornby Train passes some predetermined spot in the track layout. The device is operated by an electric battery or accumulator and the simple connections required are as follows.

A wire connects one battery terminal to one terminal of the bell, buzzer or whatever apparatus is used. The second terminal on the latter is connected to a wire making contact with the metal rails, whilst a wire from the other battery terminal passes under one of the sleepers in the track, and its end, stripped bare, projects upward between the rails. It is important to see that this wire does not make electrical contact with the rail. The train brushes against the bare wire in passing and the circuit is completed, since the current passes through the train to the rails.

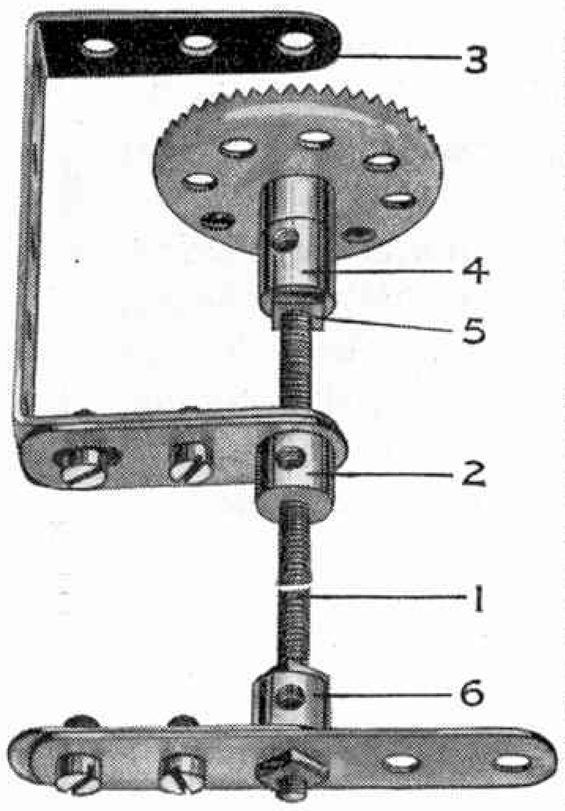


Fig. 30

Many other suggestions are to hand concerning electrical signalling systems and these will be carefully examined and published, if suitable, in this section.

(33)—Small Rubber Tyres

(H. Witherall, Weston-super-Mare)

In several models of motor-cars, etc., built with Outfits Nos. 2 and 3, Flanged Wheels are employed for the road wheels, and our contributor points out that the small rubber rings found on sewing machines form very satisfactory "tyres" for use in connection with these models.

The rings are placed on the wheel flanges and held in position by 1½" Strips mounted on the axle and pressed tightly against the wheels by means of Collars and set-screws. The rings may be obtained for a few pence each at all sewing machine depots.

(34)—Anchorage for Telpher Span

(H. Harris, Birtley, Co. Durham)

Many of our readers whilst constructing the Telphar Span (see Models Nos. 36 and 108 in the complete Manual), probably have experienced some difficulty in finding a suitable point at which to secure the pulley bracket and end of the guiding

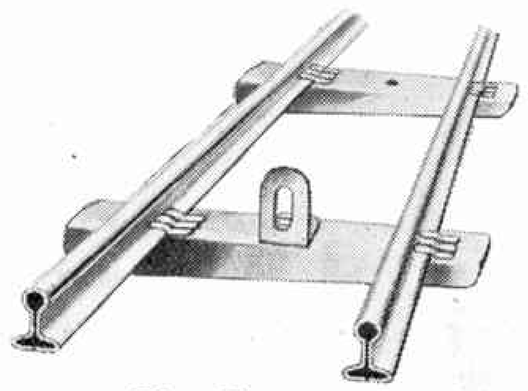


Fig. 31

cord in this model, for it is not always an easy matter to obtain permission to screw them in the middle of a nicely decorated wall! Master Harris has solved this little problem in a most interesting manner, however, and at the same time has evolved a method that enables one to assemble or dismantle the model in the space of a few moments.

The device consists of an Axle Rod 1 passed through the keyhole in the lock of door, as shown in the diagram, Fig. 34, and clamped tightly in position by a Bush Wheel 2 on one side of the door and a 1" Pulley with set-screw 3 on the other. The guiding cord, on which the trolley or travelling bucket runs, is tied to an Angle Bracket 4 bolted in the lower hole of the Bush Wheel, while the operating cord is led round a 1" Pulley 5 mounted on a short Rod journalled in the Cranked Bent Strip 6. The latter is secured very rigidly to the Bush Wheel.

The main portion of the model should be screwed, if possible, to the floor or table, or heavily weighted in order to withstand the strain on the cords.

(35)—Right-Angle Drive

(G. Wilcox, Broadstone)

George Wilcox suggests that shafts rotating at right-angles to one another may be coupled together by means of two Bush Wheels and a few nuts and bolts. The latter are bolted to the Bush Wheels, one in every hole, and the wheels are mounted on the shafts so that the shanks of the bolts intermesh. In several cases this contrivance may be used in place of Bevel Gears.

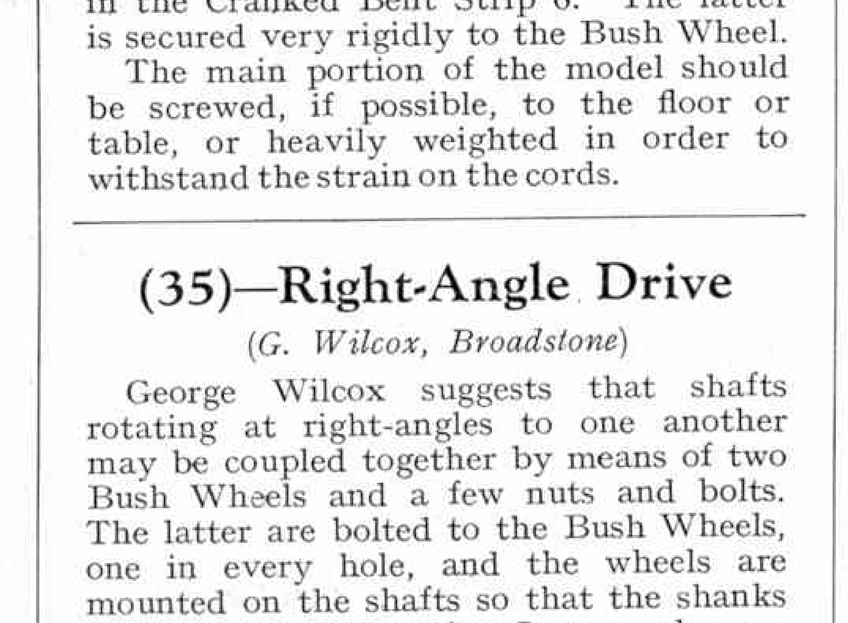


Fig. 34

(36)—Accumulator Carrier made with Meccano

(J. Heap, Heywood, Lancs., and C. F. Chell, Wolverhampton)

An accumulator has always proved a troublesome article to carry, on account of its weight and the danger of spilling acid upon one's clothes. Two contributors submit ideas for an easily made device, however, that will overcome these difficulties to a large extent.

The apparatus consists of a base built up from short Angle Girders, or other parts, to the necessary size. Strips 2 are pivotly mounted at each corner on Axle Rods passed through the base, and are connected to the upper Strips 3, the joints consisting of Rods 4. The length of the Strips 2 and 3 depends upon the size of the accumulator to be accommodated.

The handles are formed by Axle Rods 5 passed through the ends of the Strips. A more comfortable grip will be obtained by placing lengths of rubber tubing 6 on the Rods, or better still, by using round wooden pegs in their place.

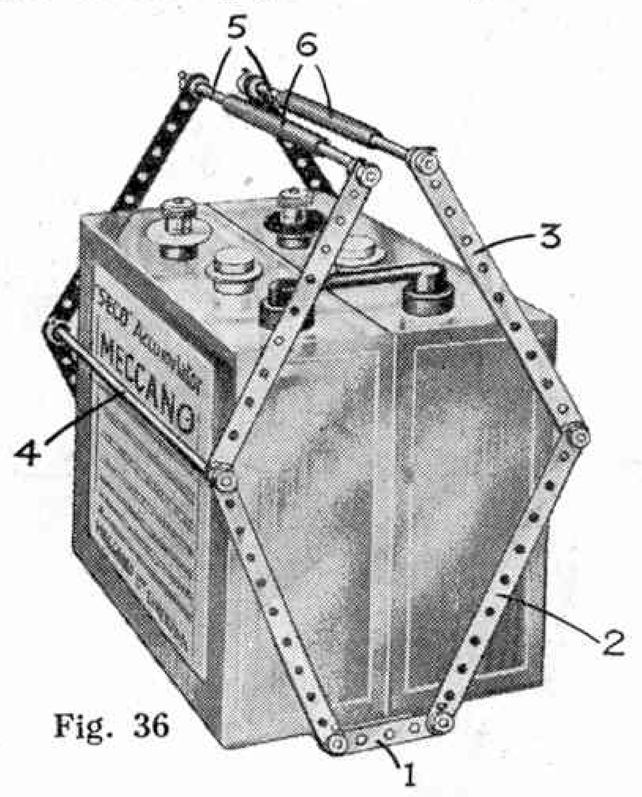


Fig. 36

It is interesting to note that Mr. Heap was awarded first prize for his idea in a "Wireless Accessories" Competition in the *"Manchester Evening Chronicle."*

(37)—Miniature Concrete Blocks

(R. H. Tresise, Burton-on-Trent)

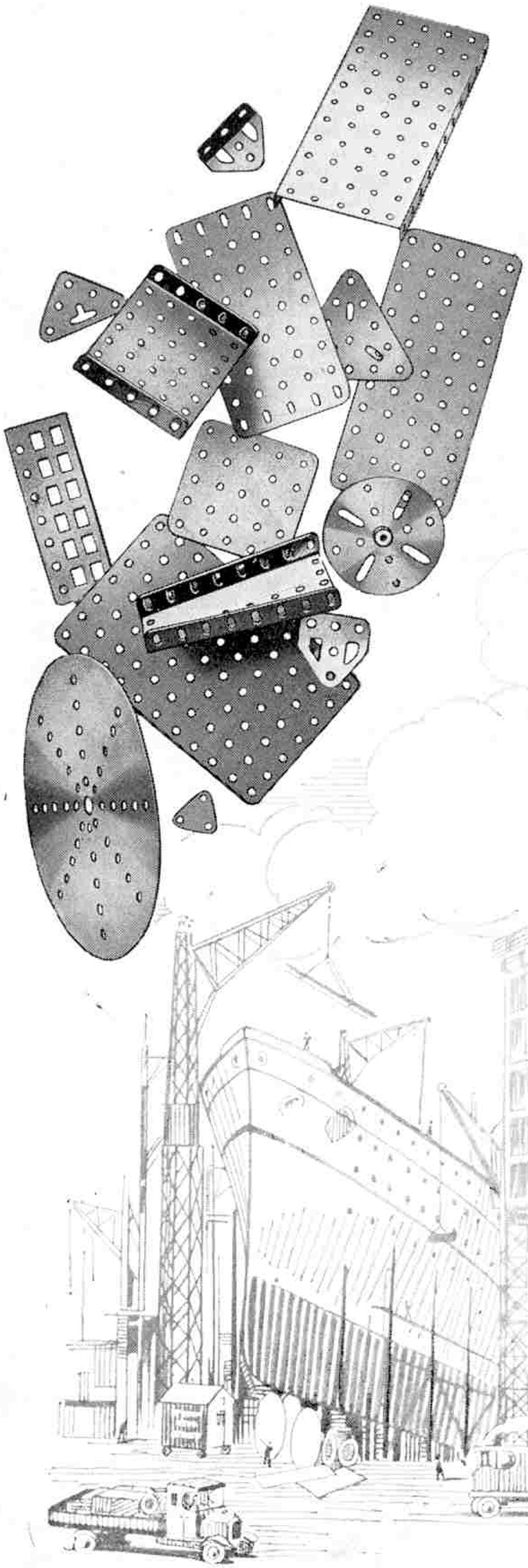
Miniature concrete blocks will add considerably to the fun that may be obtained from such models as "Titan" cranes, and will serve admirably as ballast in loading Hornby goods wagons. They may be made by mixing together a little sand, cement, and water, and moulding in tins or match-boxes.

This Month's Awards

Five shillings will be awarded to each of the contributors concerned for Suggestions Nos. 30, 34, and 36 (two awards); whilst the senders of Nos. 31, 32, 33, 35, and 37 will each be presented with a Certificate of Merit, together with a complimentary copy of "Meccano Standard Mechanisms."

Replies to suggestions concerning Meccano and Hornby Train improvements appear on page 263.

MECCANO ACCESSORY PARTS



Plates

THE manufacture of steel plates in actual practice has been brought to a wonderful pitch of perfection.

This is due chiefly to the fact that the amazing evolution of armaments—which reached its climax during the Great War—necessitated the constant production of plates of sufficient toughness to afford some measure of protection for warships, forts, tanks, etc., against the terrible and ever increasing power of enemy armour-piercing projectiles and high-explosive shells. New inventions and improved methods of preparing and rolling the metal followed each other in quick succession, until to-day it is possible to produce steel plates of huge dimensions and strength.

Now that more peaceful times prevail, the improvements in steel plate manufacture are showing their merits in the construction of engines, boilers, ships, bridges, and similar structures.

Meccano plates, like their prototypes in real engineering, are made of the finest steel only, and are highly polished, with smooth rounded edges and corners. The holes are punched cleanly and accurately and arranged according to the Meccano equidistant system, which enables the plates to be incorporated in any kind of model and used for **a thousand and one different purposes.**

			s.	d.
52.	Perforated Flanged Plates, $5\frac{1}{2}'' \times 2\frac{1}{2}''$, $\frac{1}{2}''$ Flanges	each	0	5
52a.	Flat Plates, $5\frac{1}{2}'' \times 3\frac{1}{2}''$	,,	0	5
53.	Perforated Flanged Plates, $3\frac{1}{2}'' \times 2\frac{1}{2}''$, $\frac{1}{2}''$ Flanges	,,	0	3
53a.	Flat Plates, $4\frac{1}{2}'' \times 2\frac{1}{2}''$	,,	0	3
54.	Perforated Flanged Sector Plates...	,,	0	3
61.	Windmill Sails	,,	0	2
70.	Flat Plates, $5\frac{1}{2}'' \times 2\frac{1}{2}''$	,,	0	3
72.	,, ,, $2\frac{1}{2}'' \times 2\frac{1}{2}''$	,,	0	2
76.	Triangular Plates, $2\frac{1}{2}''$	,,	0	2
77.	,, ,, $1''$	,,	0	1
109.	Face Plates, $2\frac{1}{2}''$ diam., with centre boss and set screw	,,	0	4
118.	Hub Discs, $5\frac{1}{2}''$ diam.	,,	1	3
126.	Trunnions, $1''$ deep, $\frac{1}{2}''$ flange	,,	0	3
126a.	Flat Trunnions, $1\frac{1}{2}'' \times 1\frac{1}{2}''$	,,	0	2
133.	Corner Brackets	,,	0	3
145.	Circular Strips, $7''$ diam. over all	,,	1	0
146.	,, Plates, $6''$,, ...	,,	1	3

Your dealer will be pleased to show you all the Meccano Parts. Ask him for a complete list.

MECCANO LTD., BINNS ROAD, LIVERPOOL

In Reply

In these columns we reply to suggestions regarding improvements or additions to the Meccano and Hornby Train systems. We receive many hundreds of such suggestions every week, and consequently we are able to publish only ideas that show particular interest or ingenuity. Every idea, however, whether acknowledged in these columns or not, is carefully examined and considered. It would be of great assistance if readers, when submitting suggestions for consideration, would write them on separate sheets of paper and include their name and address on the back of each sheet used.

Suggested Meccano Improvements

MECCANO MAGAZINE ANNUAL.—Your suggestion that we should publish a Magazine "Annual" at Xmas each year is interesting, but its compilation would occupy too much time, we fear! As it is, the publication of our big Christmas numbers keeps us very busy indeed! (*Reply to W. Ahon, Melbourne*).

Suggested New Meccano Parts

IMPROVED WHEEL BOSSES.—It has frequently been suggested that the bosses of wheels and similar parts should be tapped on opposite sides to receive two set-screws, and the matter has received our constant notice. We have always found that a sufficiently powerful grip can be obtained with the single set-screw; the advisability of effecting the alteration in some of the larger wheels, however, will be tested further. (*Reply to C. W. Beese, Hamilton, Ont.*)

SLEEVE COUPLING AND 1" PIVOT BOLT.—Your suggestion for a "sleeve" coupling, designed to enable two wheels to revolve as a single unit about a common axle, is interesting and is being examined. The possible introduction of an improved Pivot Bolt, 1" in length, is receiving our attention also. (*Reply to C. W. Beese, Hamilton, Ont.*)

WINDING DRUM.—A winding drum of the dimensions specified may be constructed from Double Angle Strips bolted between two 3" Pulley Wheels. The grooves of the latter may be used to receive the brake bands. (*Reply to W. Wilby, High Hold, Co. Durham*).

STEAM ENGINE PARTS.—See our remarks under this heading in the January "*M.M.*" (*Reply to J. Little, Bristol, and others*).

IMPROVED STRIP COUPLING.—It was certainly a a good idea on the part of your friend to drill a hole in the split end of a Strip Coupling to connect with its existing longitudinal bore, so that either a Rod or a Strip might be secured in that end. We have made a note of this. (*Reply to H. J. Gunner, Wallington*).

RAIL CONNECTIONS.—Your suggested peg attachment, with corresponding socket, to connect rails built with Meccano to the existing Hornby track is interesting and will be considered further. (*Reply to W. V. Awdry, Box, Wilts.*).

1" DOUBLE BRACKET.—The proposed Double Bracket, to measure 1"×1" will be borne in mind. Hitherto we have found little demand for such a part, however. (*Reply to C. W. Beese, Hamilton, Ont.*)

LETTERING MECCANO MODELS.—The idea of attaching letters to models, such as "L.N.E.R.," "G.W.R.," etc., is interesting, but we doubt whether they are required often enough to warrant their inclusion as special Meccano parts. (*Reply to David Floyd, Swindon*).

BOILER.—We note your suggestions for a Meccano boiler, curved girders, etc. The addition of such parts has occupied our attention for some time past; it is difficult however, to standardise them with the present system so that they may be used in the greatest possible number of models or movements. (*Reply to C. Hood, Taunton, and H. Henshaw, Bolton*).

COMPRESSION SPRINGS.—The introduction of compression springs is under consideration. Small springs of this type are included in the Spring Buffer (Part No. 120A) already. We regret your suggested addition to the Crankshaft is not practicable. (*Reply to H. Fox, Christchurch, N.Z.*)

NEW FORK PIECE.—We are testing the practicability of a Fork Piece with 1" sides (two holes). (*Reply to F. Franklin, London, N.15*).

GROOVED RODS.—We fear the diameter of Meccano Axle Rods is too small to permit the cutting of a groove and the successful operation of sliding gear changes, etc., by this method. We have other devices in hand, however, with which to obtain a similar movement. (*Reply to H. Teall, London, S.W.9, and H. C. van Doorn, Utrecht*).

Suggested Hornby Improvements

COUPLED WHEELS IN No. 1 LOCOS.—The suggestion that the driving wheels of No. 1 locos should be coupled will come up for review later. (*Reply to V. G. Eckersall, Prestwich, and many others.*)

TERMINAL STATION.—Further to our statement under this heading in the January "*M.M.*," we hope to announce shortly a new device with which it is possible to convert the present "Windsor" Station into a terminus. (*Reply to K. B. Mathews, Eastbourne, C. and W. Booth, Burnley, and many others*).

DOUBLE RAILS.—We have devoted considerable attention to the design of parallel track. Your suggestion for double straight and curved rails is noted and will be examined carefully. (*Reply to W. Close, Diss*).

VIADUCT IMPROVEMENTS.—Your criticisms concerning the Hornby Viaduct are appreciated and will receive very careful attention. (*Reply to A. D. Hill, Sheffield*).

8-WHEELED WAGON.—There appears to be little demand for an eight-wheeled open mineral wagon, but we note your suggestion. Mail Van; see our reply under this heading in the January "*M.M.*" Hornby trains may now be obtained lettered G.W.R. (*Reply to J. Morris, Chateau d'Oex, Switzerland*).

0-6-0 LOCOS AND COACHES.—We do not think locomotives and coaches with six wheels would possess any special advantages over our existing types, but we will bear your ideas in mind. (*Reply to W. Close, Diss, and J. Morris, Chateau d'Oex, Switzerland*).

CHECK RAILS.—We do not consider that the addition of check rails to Hornby curves as a guard against derailments would be justified. Such accidents should be very rare, providing the track is carefully and securely laid. (*Reply to L. Ison, Melbourne*).

PLATELAYER'S HUTS, TROLLEYS, AND GRADIENT INDICATORS.—The introduction of these and similar accessories will come up for careful consideration later. (*Reply to D. Jagger, Lightcliffe, A. V. Strong, Cardiff, G. Lawson and M. Wilcox, Seascale*).

RACK RAILWAY.—The introduction of the rack system for use with steep gradients is scarcely suitable, and, we think, would meet with little demand. (*Reply to O. Goodman, Croydon*).

CONSTRUCTIONAL ACCESSORIES.—We note your suggestion for the introduction of enamelled plates, coloured to represent engine shed sides, station roofs, tunnels, etc., and perforated to receive Meccano nuts and bolts, with which various accessories for the Hornby system may be constructed. This is novel, but we fear scarcely practicable, although the idea will be borne in mind. (*Reply to C. & W. Booth, Burnley*).

DISTANT CONTROL OF SIGNALS.—We are carrying out a number of experiments in regard to the operation of Hornby signals from the signal-boxes and various points in the track, and hope to announce further details shortly. (*Reply to L. T. Smith, Norwood*).

SHUNTING SIGNALS.—We shall consider the introduction of shunting signals of various types. (*Reply to C. Hare, Southport*).

LOW VOLTAGE ELECTRIC TRAINS.—We are experimenting with Hornby Trains operated from a current of 4-6 volts. Watch these pages for future developments. (*Reply to Eric Pardoe, Croydon*).

TRAIN INDICATOR.—See our reply under this heading in the "*M.M.*" for December 1925. (*Reply to John Begg, Glasgow*).

ARTICULATED ROLLING-STOCK.—See our reply to this suggestion in last month's "*M.M.*" (*Reply to Michael Denton, Guildford*).

ENGINE SHEDS.—The question of introducing these accessories has been under consideration for some time past and we hope to announce the results of our experiments shortly. (*Reply to Miss M. Quennell, London, N.W.5; F. C. Smith, London, N.15; D. F. E. Nash, Sutton; D. T. Felstead, Burton-on-Trent; M. Watkins, Liverpool; R. Coverdale, Hornsea; A. W. Cockman, London, N.12; A. Hodgkinson, Fleetwood; M. Chalmers, J. Paton and L. Anderson, Glasgow, and others*).

4-6-0 LOCOS.—Further to our replies concerning suggested new locos, we have received a number of letters pointing out that 4-6-0 locos, 0-6-0 tank engines, and other types may be adapted to run over our existing 0 gauge curves by deleting the flange of the centre pair of driving wheels. Although such a procedure would overcome the difficulty to a certain extent, we do not altogether favour it. The introduction of such locos, together with new curved rails of larger radius, would necessarily prove more expensive to Hornby enthusiasts, and we are inclined to adhere for the present to our existing popular types. The whole question, however, will be further examined from every aspect. (*Reply to G. Lawson; and M. Willcocks, Seascale; J. Treadgold, Hunt End; V. Overall, London, E.11; S. Towler, Mitcham; J. Broadhurst, Swansea; E. Berry, Cardiff; and many others*).

CUTTINGS AND EMBANKMENTS.—We do not consider there is sufficient demand as yet to justify the introduction of Hornby cuttings and embankments. (*Reply to C. Herbert Lea, Moseley, Birmingham, and J. Marshall, London, S.E.18*).

METROPOLITAN AND SOUTHERN COLOURS.—We note your suggestions that the No. 2 Tank Locos should be supplied in Metropolitan colours and that all rolling-stock should be obtainable in the Southern Railway livery. These suggestions have been marked down for review later. (*Reply to J. Taylor, Hounslow; G. W. Clarke, Sudbury; J. Smyth Wood, London, S.W.4; L. Peavot, London, N.W.2; R. A. O. Brazier, London, S.E. 24; and others*).

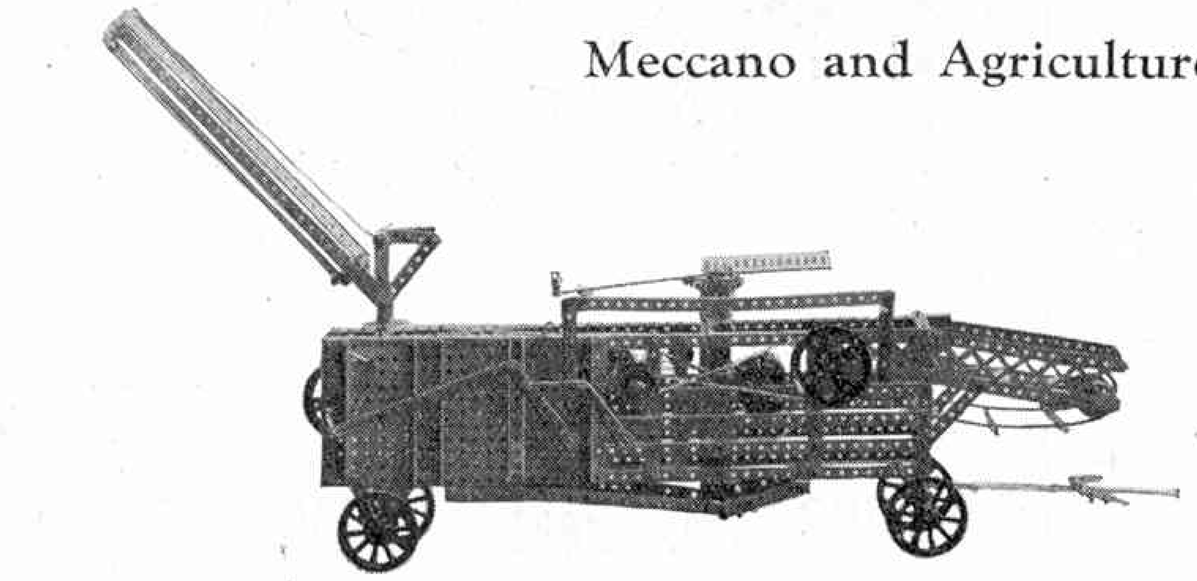
OVERHEAD WIRE FOR ELECTRIC TRAINS.—See our remarks on this subject in the February "*M.M.*" (*Reply to G. W. Clarke, Sudbury*).

GUIDE TO THE HORNBY SYSTEM.—The series of articles printed in the "*M.M.*" some time ago under the title of "How to Run a Miniature Railway System" will be incorporated in a booklet now in course of preparation. This publication will contain, in addition, a quantity of valuable information concerning the latest Hornby additions and improvements, and should prove of considerable assistance to readers who wish to derive the greatest possible amount of fun and instruction from their model railways. (*Reply to T. A. Roby, Wigan*).

EIGHT-WHEELED TANK WAGON.—This type of vehicle is not very common on British railways, but we will give your idea due consideration. (*Reply to J. Gilchrist, Hemel Hempstead*).

ELECTRIC LEVEL CROSSING.—The question of introducing a special level crossing for use with electric trains is under consideration. (*Reply to T. G. Pearce, Bath; A. S. Maultby, Lincoln; and A. Hodgkinson, Fleetwood*).

Meccano and Agriculture



We illustrate two prize-winning entries in a recent Model-Building Competition, held in the United States, which form excellent examples of the capabilities of Meccano in reproducing modern agricultural machinery in model form. The threshing machine (top) was submitted by D. H. Riek, of Rhinelander, Wis., and is complete with feeder, straw carrier, shakers, grain conveyor, etc. A fan is fitted which in actual practice blows the straw through the blower shaft, or straw chute, for stacking purposes. All the operations are driven from a Meccano Clockwork Motor. The lower illustration shows a smaller threshing machine complete with tractor and tender, built by Robert Jensen of Nebraska. The necessary power for the operation of this model and for the propulsion of the tractor is obtained from the mechanism of an old alarm clock!

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THE Gibbons' approval sheets do not contain damaged or heavily cancelled stamps. Each specimen is in perfect condition, and the arrangement helps you in selecting those you require. This is the only satisfactory way to buy stamps, and remember, Stanley Gibbons' prices are always remarkably low. Write to-day for approval sheets, sent post free anywhere.

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½ lb. (about 2,500 stamps) **1/6**; post free **1/10**
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PHILIP J. DYKE,
122, GLADSTONE ROAD, WIMBLEDON.

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SPECIAL CLEARANCE OFFER of packets of **British Colonials.** Every packet guaranteed to contain 1,000 (all different) genuine, clean, and free from paper stamps. As there are a limited number only, all orders will be taken in strict rotation.

Price **57/6** each (post free).

Cash with order, which will be refunded if packets not approved of.

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7, Dundonald Drive, Leigh-on-Sea. (Est. 1879).

FREE 100 **Diff. Stamps mostly unused.**
Enclose addressed Envelope for Approvals.
AIR POST I MUST HAVE THESE 50 ALL DIFFERENT. **4/-**
M. REGIND, 30, SWANAGE ROAD, SOUTHEND

A CORRECTION

Owing to an unfortunate error an advertisement of Mr. H. C. Watkins, Granville Road, Barnet, announcing a competition for stamp collectors, appeared in our February issue. This was wrongly inserted as the competition, which was announced in our December and January issues, had already closed. We understand that Mr. Watkins has advised applicants direct to this effect.

100 DIFFERENT STAMPS
2 TRIANGULAR STAMPS
24-page DUPLICATE ALBUM } **FREE!**

An extraordinary offer: 100 different stamps from:—Japan, old Belgium (1893), long set Ukraine, U.S.A. (Washington), Austria (newspaper), Russian Army, old G.B. Set 10 rare stamps overprinted, old 40 all different unused. Fine set Hungary (reapers, birds, etc.) Also a very beautiful pair of "three-cornered" stamps and a useful 24 ruled page duplicate Album. **SEND NO MONEY. JUST A POSTCARD** and request this big parcel and approvals.

LISBURN & TOWNSEND, LONDON ROAD, LIVERPOOL

FREE THE ELM PACKET. 100 DIFFERENT AND PERFORATION GAUGE **FREE**

The Elm Packet includes a fine set of **FRENCH COLONIALS** from Algeres, Cuyane (ant eater), Soudan (Arab), Oubangui-Chari (leopard), Guadeloupe (view), Wallis and Futuna (bird), Reunion (map), Equatorial Africa (native). Set of 50 unused **GERMAN,** including Munich Exhibition, scarce high value large numerals, set of workers, Air Mails, Officials, high value Provisionals. Also Chili (Columbus), Poland (eagles), set of old G.B., British Colonials, etc., **ABSOLUTELY FREE TO GENUINE COLLECTORS REQUESTING APPROVALS.** Those sending 2d. for postage will receive set of Portuguese Colonials. Special offers. 50 diff. French Colonials, 6d.; 100 diff., 1/6; 25 diff. Turkey, 7d.

J. BURTON, 3, ELM BANK, WALTON BRECK ROAD, LIVERPOOL.

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Postage 2½d. extra. Abroad 6d. extra.

In addition FREE Sets will be sent to those who send names and addresses of stamp collecting friends.

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Union of South Africa, pictorial new issue, ½d. and 1d. Two Kinds. Set of 4 Price **3d.**
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Containing **Jamaica** (pictorial), **U.S.A., GERMAN SURCHARGE,** Roumania, **Nigeria,** Belgium, **Ceylon,** Canada, **Oceania,** S. Africa, Jugo-Slavia, **scarce MALTA King Edward 1d.,** India, **Gold Coast,** Mexico, and others, making 107 all different, to those **sending a postcard** requesting approvals.

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This beautiful complete set of very large Roumania Pictorials depicting the Queen weaving and bearing the motto "God guide our hand" (translated). Priced at 3/6, presented free to applicants for approvals. Send a Postcard Now.

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FREE! SCENIC PACKET **FREE!**

It contains only **Twenty Different** stamps, but there is **no Neurope Trash.** They are **all good ones** and include:—

6 Different **Mozambique Company,** depicting **Native Village,** African Native with trophy of **Elephant Tusks,** Field of Maize, **Railway Train** in E. Africa, Coat of Arms, etc.; **Six Guatemala** (Signing of Independence, Temple of Learning, Parrot, The **National Palace,** Statue of Columbus, the scarce **1 Peso** stamp, etc., **Algeria** (surcharged), Dahomey (gathering coconuts), Guinea (natives fording river), **Madagascar** (palanquin), Argentine (Pan-American Congress stamp), **Costa Rica** (statue to Juan Santamaria), Greece (**Postage Due**) and **Hyderabad** (Indian Native State). **Twenty Fine Stamps** in all, **Free** to you. Send 2d. for postage of my 60 p. Price List and 12 page list of Accessories (abroad 3d). Also **Three Scarce Cochin Free To Responsible Approval Applicants.** Write to-day to **EDWARD SANDELL, 10-11, FETTER LANE, LONDON, E.C.4.**

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All genuine applicants for approvals can have any one of the following sets absolutely free:

A. **14 Ukraine Pictorials,** complete set.
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C. **9 Dominicana Republic,** all maps.
D. **6 Large Crete,** beautiful pictorials.
E. **7 Fine Unused Roumania,** portraits.
F. **100 War, Revolution and Armistice.**
G. **18 Switzerland,** a nice collection.

SEND A POSTCARD AND STATE LETTER AT SIDE OF SET REQUIRED.

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108 GIANT PACKET FREE

All genuine applicants for approvals will receive this giant pac et of Colonial and Foreign Stamps, all different, catalogued nearly 10/-, including War, Revolution and Peace issues, Surcharges, Pictorials, Maps, Portraits, Animals, Ships, Birds, etc., etc. Send a postcard only.

H. WATTERSON, 2, ELM BANK, WALTON BRECK ROAD, LIVERPOOL



Stamp Collecting

Minute Differences for Sharp Eyes

by R. Kay Gresswell

THERE is often considerable difference of opinion on the part of stamp collectors as to whether minute variations in stamps, such as are caused by retouching dies, etc., should or should not be included in a stamp collection. The matter is, of course, one for each collector to decide for himself, and while it may be advisable to ignore such varieties in general collections of the whole world or of large groups of countries, yet much of the joy in the hobby lies in searching for these slight variations.

Varieties of Georgian Stamps of Great Britain

Die A.	Wmk. Imperial Crown		½d., 1d.
Die B.	,,	,,	½d., 1d.
Die B.	,,	simple Royal Cypher	½d., 1d.
Improved types.	,,	Imperial Crown	½d., 1d.
,,	,,	simple Royal Cypher	½d., 1d.
,,	,,	multiple Royal ,,	½d., 1d.
Present types.	,,	simple Royal ,,	½d., 1d.
,,	,,	multiple Royal ,,	½d., 1d.
,,	,,	,, block Royal Cypher	½d., 1d.

Our advice to any readers who may be hesitating about this matter is that they should collect at least one country in detail, taking into account all die varieties, variations in watermark, perforation and so on. The remainder of the collection may be dealt with on broader lines and small differences ignored if thought to be desirable.

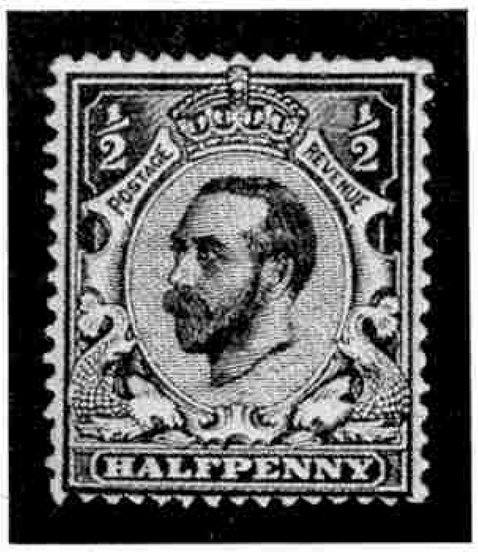


Fig. 1. Die A

Early Georgian Stamps of Great Britain

The ½d. and 1d. stamps (Figs. 1 and 6) issued throughout Great Britain at the beginning of the present reign from the Coronation Day, 22nd June 1911, to the end of 1912, form a very interesting series in regard to detailed differences. Between these two dates these two values suffered a history of endless change in an endeavour on the part of the authorities to obtain a stamp that was satisfactory in design.

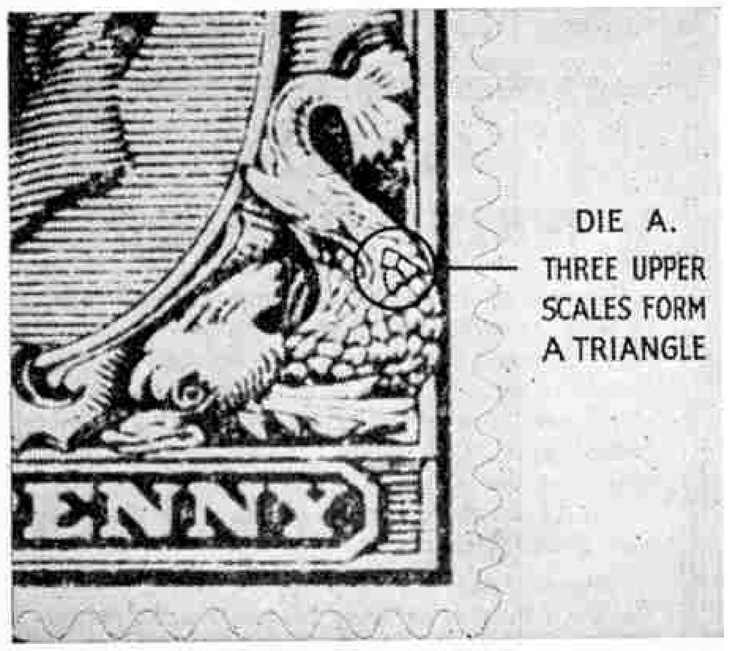


Fig. 3. Enlargement of Halfpenny, Die A

Public Disapprove New Stamps

When they were first issued on the Coronation Day the two stamps received many adverse criticisms from the public, chiefly owing to the blurred appearance of the whole design and the poor likeness of His Majesty, who was pictured three-quarter face. The white lines of the hair, beard and eye had been engraved so finely that under heavy inking they soon filled up and printed as a solid block of colour on the stamp.

These original stamps were engraved by the Royal Mint and printed by Messrs. Harrison and Sons on paper watermarked with an Imperial Crown and perforated 15×14, although varieties are known to exist perforated 14 all round. The head was copied from a photograph chosen by His Majesty and the frames were designed by Sir Bertram Mackennal, A.R.A.



Fig. 2 New Type

Much of the blame naturally fell upon the printers, but it must be remembered when criticising them that they had had only about twelve months' experience of stamp printing and that they had no control over the choice of design, or the paper, or the engraving of the plates.

To reproduce a photograph by a line drawing satisfactorily requires a large number of fine lines and for this reason it is an unsuitable subject for a stamp design. The stamps were to be printed by surface printing, in which the design is printed by the raised lines of the plate. When the design consists of very fine lines, the spaces between them soon become clogged with ink thus

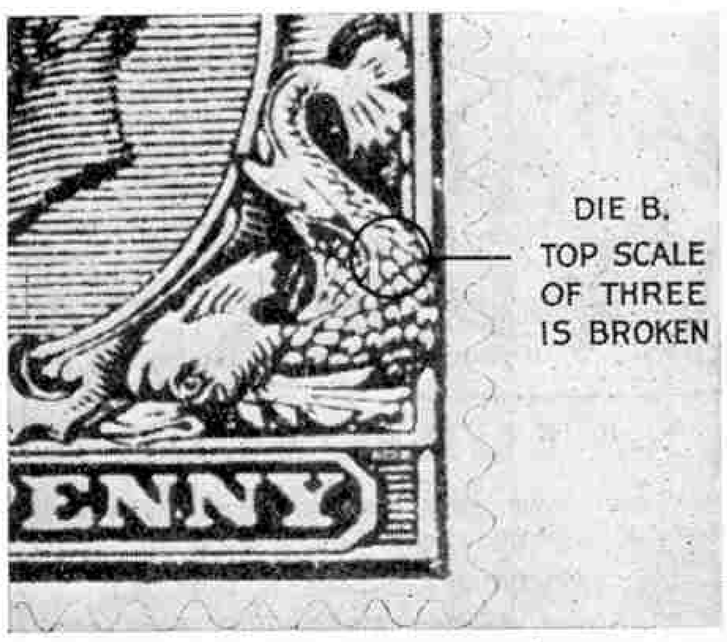


Fig. 4. Enlargement of Halfpenny, Die B

100 DIFFERENT Stamps free; send for ½d. approvals.—Cox, 135, Cambridge Road, Seven Kings.

STAMPS. 30 different for 6d., or will exchange. Apply—Green, Summerbell, Shanklin.

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Advertisement Manager,
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BINNS ROAD LIVERPOOL

An Indoor Aerial

Those of our readers who have electric light in the house and who are not able to fix an outside aerial for wireless reception can use the electric light wires as an aerial with great success. This is made possible by the Ducon adapter (manufactured by the Dubilier Condenser Co. Ltd., Victoria Road, N. Acton, London, W.3), which is plugged in to an ordinary lamp holder and is then connected to the aerial terminal of the set by a wire. There is no danger whatever from the house current reaching the set as each Ducon is tested at 2,500 volts before leaving the works.

The adapter consumes no current and does not effect the house light system in any way except that it is impossible to have an electric lamp in the same socket as the Ducon. This question only arises when it is dark and is, of course, immaterial where there is more than one lamp socket in the room.

There are a number of alternative methods by which the Ducon may be connected to the set, and these are fully explained in a booklet issued by the manufacturers. It is recommended that experiments be carried out, connecting the Ducon systematically in the manner described until the best result is obtained. Those who already have efficient outside aerials will find the Ducon useful for giving them a better earth connection. In this case the lead from the Ducon is taken to the earth terminal of the set and the makers claim that the efficiency of any set is increased by at least 25%.

We have tested out the Ducon and find that it gives all the results the makers claim. Whilst the efficiency of Ducon reception no doubt varies with the situation of each individual and the amount of wire in the house lighting circuit, we recommend any of our readers who have difficulty in fixing an aerial to experiment with the Ducon before finally deciding that it is impossible for them to have a wireless set. For instance, those who live in flats often find it is impossible to put up an aerial; others are unable to erect an aerial owing to some objection on the part of their landlord or neighbours. To such as these the Ducon has a special appeal, whilst those who already have efficient aerials are recommended to increase the efficiency of their sets by using the house wire system as an additional or separate earth. It should be mentioned, however, that the Ducon is not suitable for use with crystal sets.

Do It Now

If you've got a job to tackle,
Do it now.
Don't stand by and idly cackle
Do it now.
Do not leave it till to-morrow,
Or you'll rue it, to your sorrow.
Sound advice you now may borrow.
Do it now.

If entrusted with a mission,
Do it now.
If you've got an imposition,
Do it now.
Father Time is fleetly flying,
That's a fact there's no denying,
Never fail for want of trying.
Do it now.

If you want to fight your neighbour,
Do it now.
Things put off do lose their flavour,
Do it now.
Be as lively as a linnet,
Do not say "just wait a minute."
When a job you see, begin it
Do it now.

A. REAY, in the *Whitehaven County School Magazine.*

A Rare "PENNY RED"

Most of the penny reds are catalogued at from about 2d. to 6d. each, used. After Plate 77 (a very scarce stamp) the next rarest is the last in the series, Plate 225, which is catalogued at 25/– used and 50/– unused. All the remainder are priced below 1/– with three exceptions. These are Plate 133, which is catalogued 1/– used and 20/– unused, Plate 219, catalogued 1/6 used and 3/6 unused, and Plate 223, catalogued 1/– used and 5/– unused. The 1d. rose red, Plate 116, imperforate, was issued at Cardiff and is catalogued £30, but you are not likely to come across any of these.

Stamp Collecting—(*contd. from page* 267)

Success at Last!

These two stamps, while a great improvement on any that had been issued before bearing the head of King George V. for use in this country, were by no means as striking or as pleasing as the stamps of an important country should be, and so in October 1912, the present one penny stamps were issued with an entirely new frame and with a side-view portrait.

This was a great improvement and in the following January (1913) there appeared the present halfpenny which was in the same frame as the previous halfpenny but with the new side-view head. Thus ended the long search for suitable low-value stamps for this country and stamp collectors have been provided by it with a very interesting album page. We advise all our readers to collect all the varieties of these stamps for they are very interesting and illustrate in a very full manner the difficulties that can be encountered when making a stamp.

Re-modelling a Bridge—

(*Continued from page* 259)

The new bridge will make the Harlem River more readily navigable. Owing to its many turns and obstructions this has never been a favourite route for ships or barges, but the clearing of the channel by removing the obstructing piers will make it possible to carry out such improvements as will provide a useful short cut from the Sound to the Hudson.

We are able to reproduce on page 259 a drawing showing how the bridge will appear when completed, and our readers will agree that the effect is very fine. It is interesting to compare this drawing with the illustration of the Washington Bridge on page 407 of the August "*M.M.*" and to note how closely the general lines of this bridge have been followed in the new High Bridge design.

MECCANO WRITING PADS

These Writing Pads are becoming increasingly popular and most of the letters we receive from Meccano boys are written on the familiar tinted paper. The pads are supplied in two sizes, each consisting of 50 sheets of printed bank paper, with cover. They are just the thing to use when writing to your friends, for the special notepaper shows at once that you are a Meccano boy.

Prices—Large, 1/– each (post free); Small, 6d. each (post free), from Meccano Ltd., Binns Road, Liverpool.

giving a smudgy and blotchy appearance to the resulting work. This is what occurred in this case.

Attempted Improvements

The public opinion against these two stamps was so great that soon after they had been issued the printing plates were treated in a special manner so as to make the lines of the engraving deeper, in the hope that they would not then become filled with ink.

The stamps printed from the deepened plates may be distinguished from those from the originals owing to one or two small differences, and in order that our readers may be able to identify these varieties, we have specially prepared large illustrations of parts of these stamps so as to make quite plain the variations in detail. In both values the original die is referred to as Die A and the deepened die as Die B.

Difference in the Halfpenny Stamps

In the halfpenny value, part of the frame consists of two dolphins one on either side of the lower part of the design just above the word "halfpenny." The scales on the upper part of the body of the right-hand dolphin are in Die A in the form of a triangle, each scale being complete as shown in Fig. 3. In Die B the top scale of the three is broken, as is clearly shown in the second illustration (Fig. 4).

This is the most popular test for these two dies but there are many other variations that are often of assistance when the top scales are covered by a postmark. In the portion of the stamp shown in Fig. 3 and 4 it will be seen there are two "⌟" shaped white lines one below the other forming part of the outer frame of the stamp. On comparing the two illustrations it will be seen that the end of the up-stroke is in every case pointed but that the shape of the points on those in Die A is quite different from the shape of those in Die B.

Other variations are: the fine lines of the lower part of the beard are blurred in Die A and clearer in Die B, and the eye is much more blotchy in the first die.

Dies A and B in the Penny

The one penny value has a very simple difference in the two dies. In Die A, the ribbon on the right-hand side of the crown has long shading lines, the second line from the crown extending unbroken from the top solid colour to the lower solid colour (see Fig. 5). In Die B this line is broken in the middle and the whole of the shading on the ribbon is in short lines (see Fig. 7). There are also other minor differences such as the pearls on the crown, which appear like a strand of rope in Die A and which are much more distinct and better formed in Die B.



Fig. 5. Enlargement of Die A, Penny



Fig. 6. Die A, Penny, showing "lean" lion



Fig. 7. Enlargement of Die B, Penny



Fig. 8. New Type Penny, showing touched-up lion

Both dies of both values appeared on paper watermarked Imperial Crown, but the Die B stamps also appeared, in August 1912, on paper watermarked simple Royal Cypher, that is, "G v R" and a small simple crown. These stamps were only issued in booklet form.

Improving the Lion

These deepened dies, while a great improvement on the originals, met with the continued disapproval of the general public and it was probably on account of this that on the 1st January 1912, the authorities unexpectedly issued entirely new stamps of designs, which, although based upon the old, yet differed considerably with the intention of avoiding the previous defects. These new types are shown in Figs. 2 and 8 which should be compared with Figs. 1 and 6 respectively.

The new halfpenny type was not greatly different from the previous type. The same portrait was used for the King's head although the fine lines were now largely replaced by others wider spaced and therefore not so liable to become clogged with ink. In particular the parting of the hair, the eyes, the shading of the beard, the moustache, and the shading below the chin, are much clearer and lighter. The upturned points on the end of the moustache are now visible for the first time.

Concerning the frame, the design remained unaltered. The shading behind the "½" in each upper corner is now a series of parallel lines instead of a blur of solid or semi-solid colour as formerly. There is however one distinct alteration in the frame and it is by this that the two types may most easily be distinguished. In the first type (both Die A and B) there are two vertical curved lines of shading on the left side of the ornament between the dolphins' heads. In the new type these two lines have been united so that there is only one thick line as shown in Fig. 2 (the double line of the first type is shown in Fig. 1).

The new one penny type is noticeable in that the lion at the base is now shaded all over. Hitherto it had only been partially shaded and the few lines that were inserted had the unfortunate result of making the animal look very thin and hungry, so much so, in fact, that several newspapers published rude paragraphs inquiring who had been "starving the British Lion!" The shaded lion was a great improvement and put an end to this criticism.

Both these stamps were at first issued on paper watermarked Crown, but in August 1912 they appeared on the new simple Royal Cypher paper, and finally in December on the multiple Royal Cypher.

(*Continued on page* 266)

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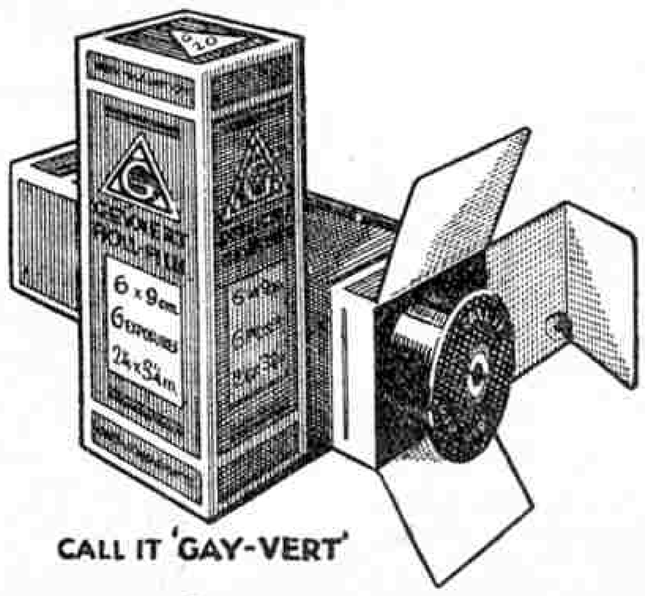
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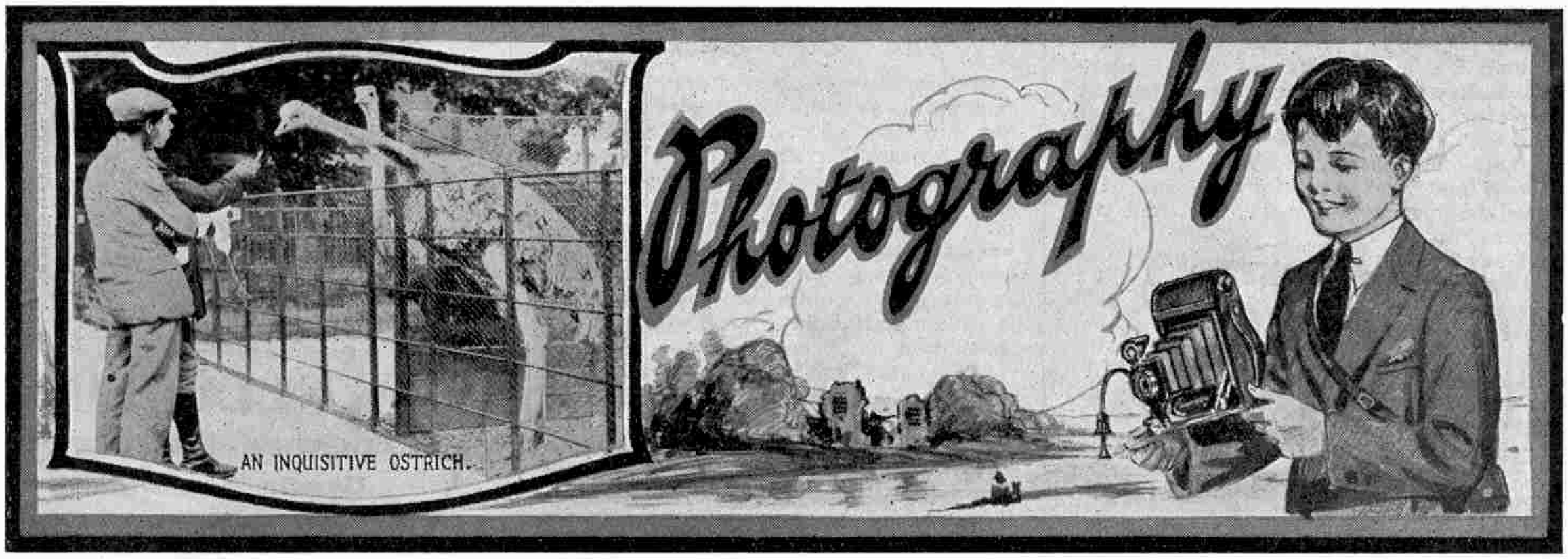


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XIII. FLASHLIGHT PHOTOGRAPHY

FLASHLIGHT PHOTOGRAPHY differs in few respects from other forms of artificial light photography and the general rules regarding lighting and arrangement of the subject, which were described in last month's article, remain unchanged.

The intense brilliance of the light from flashpowder enables us to secure striking effects by instantaneous exposures in circumstances where any other source of light would involve a very long exposure, perhaps so long as to make success impossible. Among the most interesting branches of flashlight work are silhouettes and fireside effects.

How to Make Silhouettes

The operations involved in producing silhouette effects, of which a typical example was given last month, are quite simple. First of all, a white sheet is hung across the open door of a room so as to cover completely the opening. The sitter is then posed inside the room for a profile view and the camera, which is also inside the room, is carefully focussed in order to obtain a perfectly sharp outline. When all is ready the light in the room is turned down, the shutter is opened, and an assistant outside the room ignites, say, 50 grains of flash powder. The flash illuminates the sheet and the result is a photograph showing a background of white with a black silhouette of the sitter whose figure comes between the lighted sheet and the camera.

Picturesque Fireside Effects

Fireside pictures are among the most popular forms of flashlight work and they present little difficulty in the making. The most effective results are produced by grouping two or three friends in a natural manner around the fireside, one person sitting directly in the line of view from the camera to the fire in order to shield the lens from the direct glare of the flash. The flashpowder, 50 grains at F11, should be placed on thin paper and rolled into a ball ready to be thrown into the fire at the proper moment. Focussing is done with the room lights full on and then, when everything is ready, the shutter is opened and the powder ball is thrown into a red hollow in the fire. Provided that the grouping is natural the results obtained in this manner are artistic and interesting.



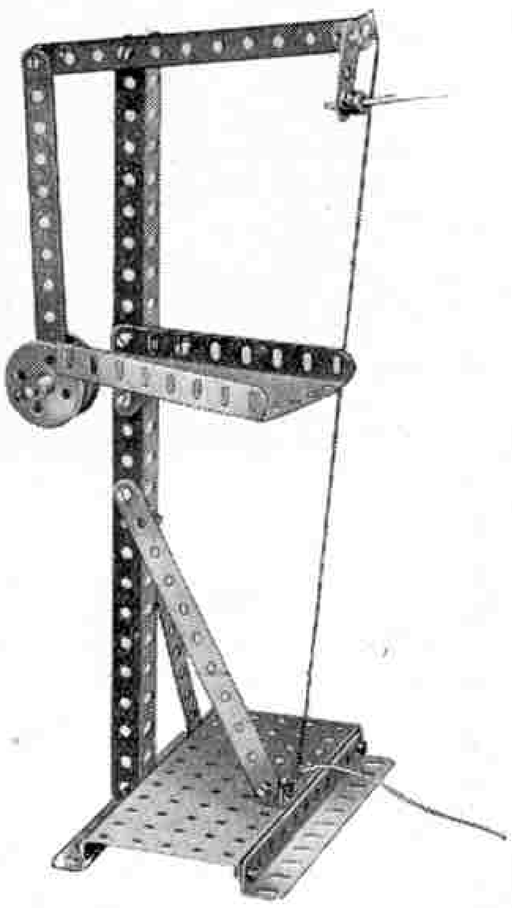
A Typical Fireside Effect

Many readers who attempt fireside studies will probably feel the necessity of obtaining a more realistic effect than is afforded by the blue-black tones of gaslight or bromide papers. A great improvement in this respect may be brought about by the use of a suitable red stain which gives more or less the ruddy effect of firelight. There is no difficulty whatever in the staining process. Supposing, for instance, we select for the purpose the "Soloid" red stain manufactured by Messrs. Burroughs, Wellcome & Co., all that we have to do is to take the prints from the washing water, remove the excess moisture, and place them in a solution of the stain for a few minutes, afterwards rinsing them in running water for a few seconds and drying in the ordinary way. The strength of the colour may be varied by using stronger or weaker solutions. Many photographers denounce strongly the use of colours in photography but there is no possible objection in this instance, and probably everyone will admit that a black-and-white fireside scene is as unreal as a snow-scene printed in the warm brown colour of self-toning paper.

Practical Operations

Coming now to practical details, let us emphasize first of all that flashlight photography is not dangerous. The flash may possibly startle nervous people who do not understand how it is produced, but it is a fact that flashpowder is perfectly safe if ordinary common-sense precautions are observed in using it. Obviously it is unwise to stand too close to the flash or to have this take place close to curtains or inflammable material.

The only apparatus required other than a camera is a tin or old tray on which to place the flashpowder and a step ladder upon the top of which the tin is placed in order that the flash shall take place at the necessary height. We have mentioned that good effects may be obtained by the use of a muslin screen between the light and the sitter to act as a diffuser. Such a screen may be used effectively in flash-light portraiture but the precaution should be taken to damp the muslin beforehand, thus obviating all risk of fire.



A Meccano Flashlight Stand, as described recently in "The Amateur Photographer"

The exposure is the next point to be considered. Knowing the size of the lens stop and the speed of the plate or film, the only point to be decided is the quantity of powder to be used. Full instructions are given with all high-class brands of flashpowder and these instructions should be followed carefully. As a rough guide for experiment the exposure on a subject between 5 ft. to 8 ft. from the camera, using F/11 and a plate of 300 H. & D.—the average speed of films—might be taken as 50 grains. If the distance of the subject is increased from 8 ft. to 12 ft. 80 grains of powder will be required.

The flashpowder should be laid in a little heap on the tin or tray, and when all is ready the camera shutter should be opened and the powder ignited by means of a long taper or match fixed to the end of a stick.

A Meccano Flashlight Stand

We illustrate a very useful stand for flashlight work that can be easily made in Meccano. It has the advantage of enabling the photographer to operate it by means of a length of string and thus include himself in the photograph. The accompanying illustration gives a good idea of the construction of the stand and the parts required are as follows :—

4	of No.	2	2	of No.	20
1	„ „	8	19	„ „	39
2	„ „	9	1	„ „	52
4	„ „	12	1	„ „	54
1	„ „	18A	1	„ „	42

1 of No. 133

The stand should be placed at a suitable height and it is best weighted down to prevent the possibility of its overbalancing when the string is pulled. The powder should be placed in a small tin on the powder stand. The action of pulling the string draws the weighted arm forward and brings the small piece of lighted taper or a lighted wax vesta in contact with the powder.

The Coming Season

Serious photographers do not put their cameras away during the winter months but carry on photographic work of one kind on another throughout the year. This is not the case with the average amateur, however, and the popular season may be said to begin at Easter. This week-end thousands of cameras that have been lying idle perhaps for months will be brought into operation, and will remain in use off and on until late Autumn brings short days and waning light.

We should like all our photographic readers, as they charge their cameras for the first time this year with plates or films, to ask themselves the question : "How many successful photographs did I obtain last year out of all the exposures I made ?" In many cases the reply must be—"Very few indeed !" The main cause of this large proportion of failures is to be found in one fault—under exposure. Over and over again we have watched beginners snapping away light-heartedly under conditions that made successful photography, with the apparatus they possessed, an impossibility.

In our photographic article next month we shall deal in detail with snapshot photography and show how easily success may be obtained if certain points are kept in mind. In the meantime we would point out that at this time of the year snapshots with the average camera demand bright sunlight or something closely approaching it.

Answers to Photographic Queries

CLEANING A LENS.—The safest method of cleaning a lens is to wipe it gently with a soft linen handkerchief that has been moistened with methylated spirit or water, but if the former is used care must be taken to prevent the spirit from reaching the cement between the lens glasses. (*Reply to R. H. Newman, Swansea*).

PERMITS TO PHOTOGRAPH.—We do not think that you will have difficulty in obtaining a permit to take photographs in and about the church you mention. Write to the Rector and explain your object. Our experience is that the authorities of any building or property are always willing to grant facilities to photographers when proper application is made beforehand. (*Reply to R. S. Dixon, Chester*).

POOR PRINTS.—It is impossible for us to give an opinion as to the cause of a poor print without having a specimen and when possible, the negative to examine. There are many causes of failure and their natures are widely varied. (*Reply to S. H. Jackson, Edmonton*).

STORAGE OF SENSITISED MATERIALS.—Sensitive materials, such as plates, films and printing paper, should be stored in a room that is free from damp, great heat or gas fumes. The last named is the greatest danger and when it is impossible to avoid a room lighted by gas, we recommend that the material be stored as far from the gas as possible and placed on a shelf near the floor. (*Reply to E. S. Roberts, Belfast*).

SILVER STAINS.—The negative is suffering from silver stain caused by coming into contact with a piece of printing paper when one or the other was in a damp condition. To remove the stain rub the negative with a pad of cotton wool bearing an abrasive preparation (a metal polish such as Globe is highly effective) for a few moments and then place the negative in a strong solution of hypo. The stain will disappear but, if very old, may take an hour or two in doing so. (*Reply to R. S. Fletcher, Malta*).

LENS VALUES.—Do not pay too much attention to the friend who says it is impossible to get good results with a cheap lens. It is not the lens but the man behind the camera who counts, and the careful photographer with a cheap lens will obtain better and more consistent results than the slipshod owner of an expensive lens. The sole difference between the large and the small, the expensive and the cheap lens, is that the former permits the taking of snapshots on days when the latter would be unusable, and under conditions when the cheap lens would be suitable for a "snap," the more expensive, by being stopped down, could secure a negative rather sharper in detail and therefore more suitable for enlarging. (*Reply to J. R. Simpson, Dundee*).

Photographers !

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OUR BUSY INVENTORS

RECENT INTERESTING PATENTS

A Portable Electric Saw

One of the latest developments in electric tools is a six inch circular saw, embodying a right angle drive. The saw is driven by a universal motor run off either A.C. or D.C. circuits and its total weight is only 15 lb. complete. The outfit can thus very easily be carried for use to any part of a workshop or yard. A convenient form of hand grip, in which the make and break trigger is located, forms part of the set.

This portable saw will accomplish any of the work usually performed by a hand saw, but at a much greater speed. In addition to timber work, the saw will cut through light sheet metal, hard rubber, asbestos board and ebonite.

The motor rests on a flat plate which is placed on the face of the material to be cut and a shield is provided to prevent particles of dust flying about.

Unloaded, the saw attains a speed of 3,600 r.p.m.

* * * *

An Improved Condenser Dial

The Indigraph, recently placed on the market by the Igranic Electric Co., is a novel but highly efficient variant of the orthodox condenser dial. It consists of a dial cover fixed to the panel by two small projections that fit into holes drilled in the panel for this purpose.

The ordinary condenser knob is replaced by a knob carrying a graduated scale rotating beneath the fixed cover. In the cover two windows are provided to enable the scale to be read. Each window is provided with a standard point to facilitate registration of scale readings on the upper portion of the cover, whilst the lower point enables markings on the dial to be located for later reference. The use of this latter point is readily appreciated, for once a setting is made it can be repeated at any later time provided, of course, that the set itself remains unaltered. This useful fixed cover is manufactured in several sizes, the smaller being for potentiometer and rheostat and the larger for variometer and condenser.

* * * *

The Maco Template

One of the most ingenious labour saving engineering devices that it has been our pleasure to observe recently, is the Maco Patent Adjustable Template recently placed on the market. This Template or adjustable gauge (shown in Fig. 1 in its normal ready-for-use position) is composed of a number of very fine strips of hard drawn solid brass, each .007 in. in thickness. These fine strips, called laminations, are held in position by two specially constructed clamps, secured by two locking thumb screws and springs, the tension of which holds the laminations firmly as they adapt themselves to the exact contour of whatever object the gauge is pressed against. In Fig. 2 the Template is seen in use, taking a profile of a rail.

The uses of the Maco Template are almost boundless, and range from the taking of rail and wheel tire profiles to making profiles of moulds for pottery. One of its great features is its extreme simplicity, it being possible for an unskilled user to handle it successfully and to obtain perfect results without fear of failure or damage to the instrument. The standard sizes are from two inches to twelve inches, and these should cover any normal need of the amateur mechanic,

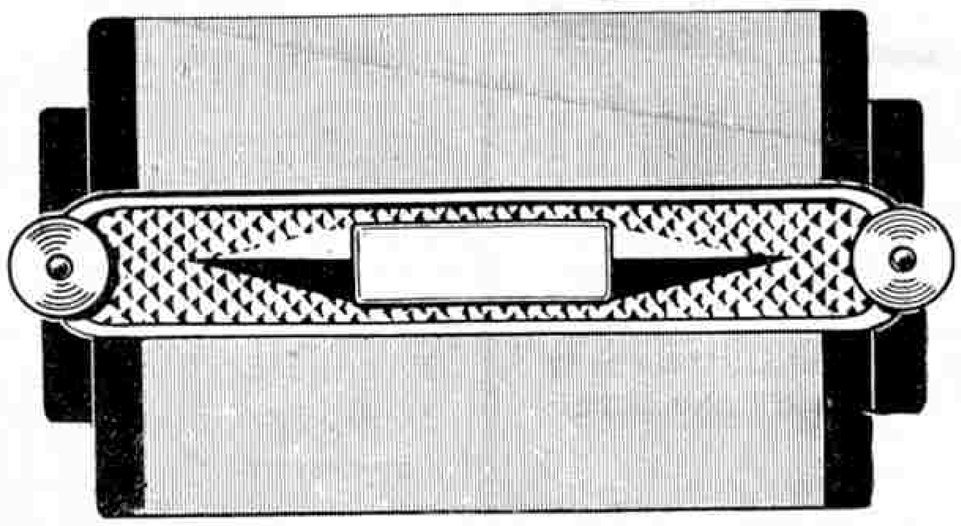


Fig. 1

but special sizes can be made on request. Those of our readers who in the past have struggled to make their own templates with clay, lead or Plasticine will appreciate our suggestion that, ere long, this type of template will find its way into every engineering workshop.

* * * *

Traffic Safety at Night

The ever increasing number of motor-cars upon the road has caused considerable

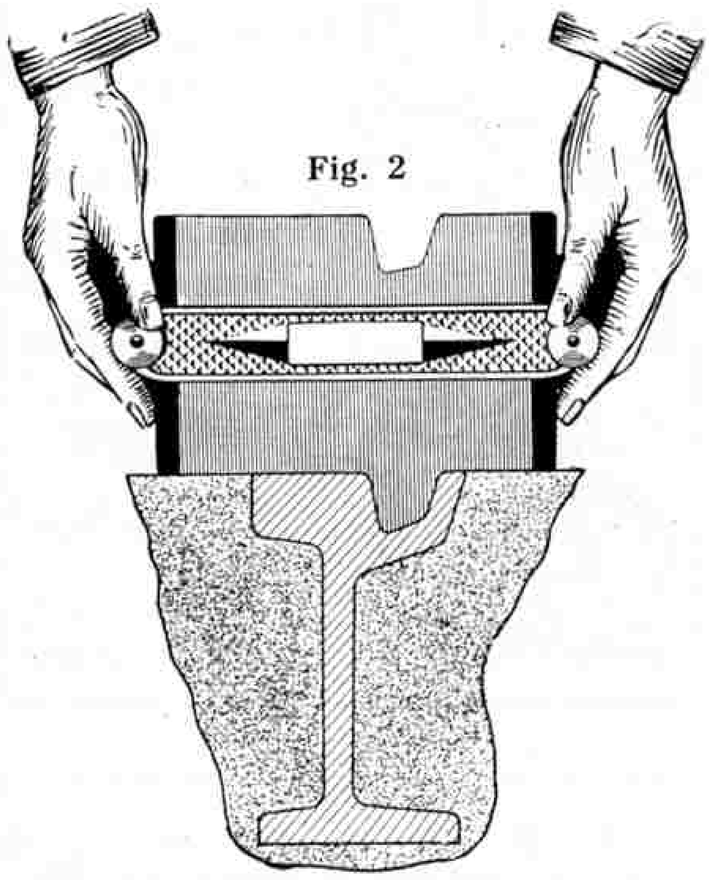


Fig. 2

brain racking in the attempt to overcome traffic dangers, more especially those arising after dusk.

The latest safety device consists of a phosphorescent arrow attached to the traffic controller's wrist at night and, as an approaching headlight flashes on to the arrow, a vivid green reflection is produced. The position of the arrow will indicate the direction in which the car may travel.

Another ingenious idea enables motor cars literally to peer round corners. This consists of two mirrors mounted at right angles to one another on the radiator cap and each set at an angle of 45° from the direction in which the car is travelling. Thus a clear view of side roads is given as soon as the car's bonnet reaches the turning. While this device obviously saves only a bare fraction of a second it will prove of considerable value, for it is only too often that an instant marks the margin between danger and security.

* * * *

Post Bag "Bombs"

Those of our readers who live on the direct line of an air route need not alarm themselves if they spot a "bomb" dropping from a passing aeroplane. In a few moments it will resolve itself into a "mail carrying" parachute. This is the anticipated outcome of the work of several inventors who are at present engaged in perfecting devices that will permit air mails to be landed safely from express machines without a reduction in speed. For example, a machine travelling from Belfast to London could drop its mail bags into enclosed spaces, along the line of route, specially reserved for the purpose by the Post Office authorities.

While full technical details are not yet available, it may be stated that each of the inventions likely to mature into the practicable stage is employing a clockwork timing delay system. The rough working plan is as follows. The bag is placed in the ejecting apparatus by a travelling Postal Official at the height of 6,000 ft. As the machine nears the enclosed space into which the bag has to be shot, he will take aim through a sighting apparatus, similar to that used by bombing planes, and at the correct moment the mail bag will be released. For the first few seconds it will drop like a stone but, when within say 30 ft. of the ground, a parachute will open and arrest the fall of the bag, enabling it to alight gently and without damage.

It remains only for some brainy reader of the *"M.M."* to invent an apparatus enabling the 'plane to pick up a bag under similar conditions of speed and height, and we can foresee the Royal Mail contracts passing definitely into the hands, or should we say wings, of Royal Mail-planes!

* * * *

For Poultry-Keepers

Those of our readers who include poultry keeping among their hobbies will find the following device an assistance in providing chickens with fresh water. A stake driven into the ground, two iron bands, a large bottle and the drinking pan are all that is required. Fill the bottle and pan with water, invert the bottle with its mouth submerged and fresh water will flow into the pan automatically as required. The iron bands of course are used to attach the bottle to the stake.

"Wireless Made Easy"

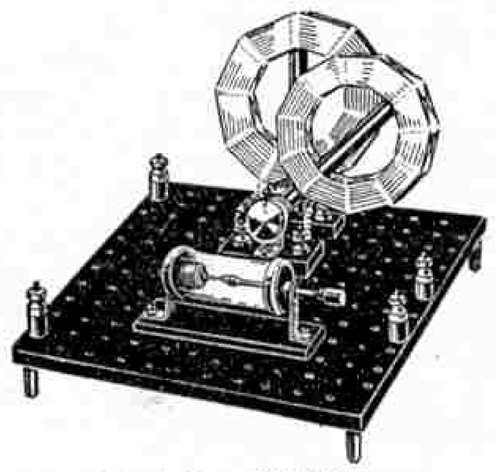
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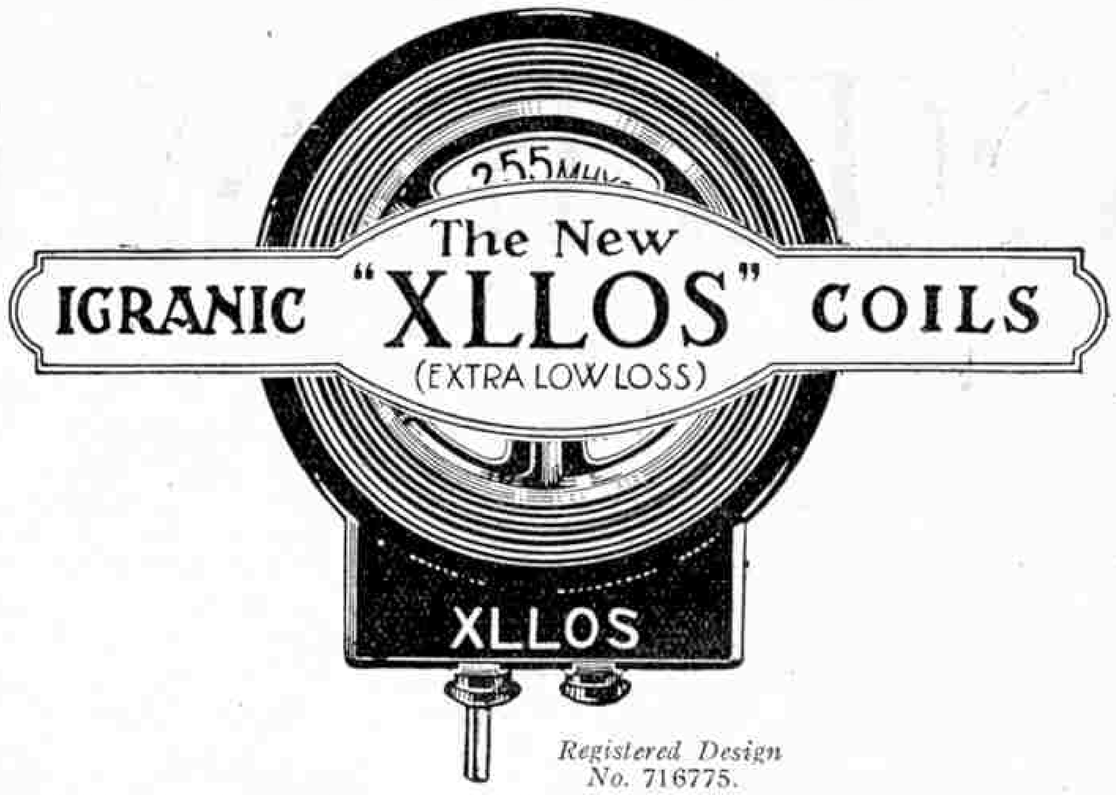
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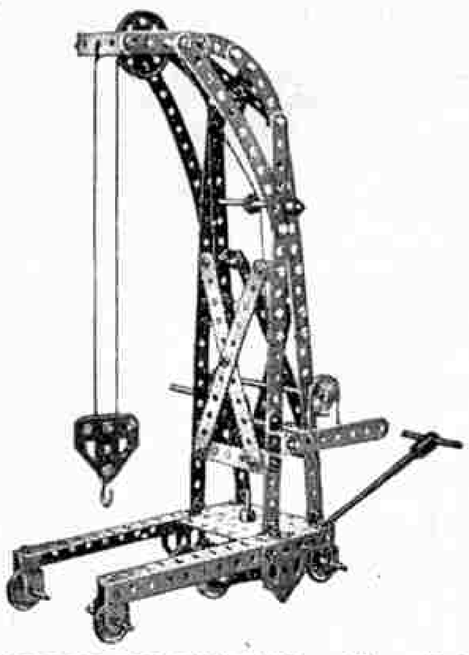
SIXTH SERIES:

Meccano Model-Building Contests

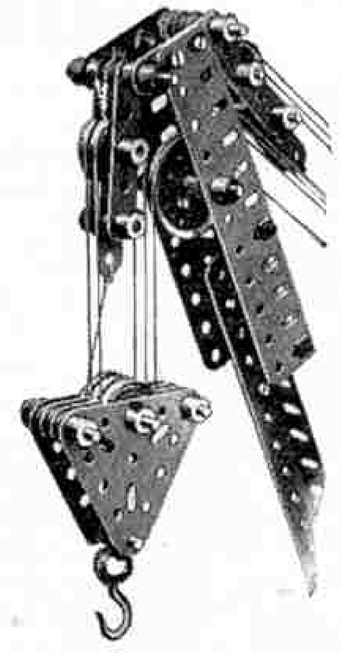
FURTHER SPLENDID PRIZES TO BE WON

The competitions announced below are the sixth pair of a series appearing in these pages each month. Many keen Meccano boys derive great pleasure from thinking things out for themselves, rather than copying from ready-made designs, and these boys should not miss the opportunity to compete for the splendid prizes offered. Every contest is complete in itself and separate prizes will be awarded for the best entries received in each. The models submitted in the competitions must be the competitors' own unaided work, both in design and construction.

In the March issue of the "*M.M.*" we announced the fifth pair of competitions of the series, in which some valuable prizes are offered. These two competitions do not close until the end of the present month.



"CRANE" COMPETITION
18 Cash Prizes



Entries in this competition will be divided into the following sections:
SECTION A, for competitors residing in the British Isles;
SECTION B, for competitors residing outside the British Isles.
Competitors' ages will be taken into consideration when judging the entries.
Prizes will be awarded for the best entries FROM EACH SECTION as follows:—
FIRST PRIZE, £3-3s.; SECOND PRIZE, £2-2s.; THIRD PRIZE, £1-1s.; SIX prizes of 10/6 each. Other competitors whose entries show outstanding merit will be presented with complimentary copies of "Meccano Standard Mechanisms," while in addition, a few special Certificates of Merit will be awarded, at the judges' discretion, for entries closely approaching prize-winning standard.
Closing date for Section A, 30th June, 1926. Overseas Section, 30th September, 1926.

HOW TO ENTER. For this month's competition we have chosen Cranes—a subject that should prove very popular. Cranes have always played an important part in Meccano model-building, owing to the fact, perhaps, that they lend themselves to a wide diversity in design, and may be reproduced with remarkable accuracy even with the smallest outfits.

You may fashion your model from any type of crane that you prefer, or with which you are most familiar. Derricks of all types, gantries and all other kinds of cranes will be accepted under this heading, and they may range in size from the small portable crane to the giant block-setting structures.

When completed, send in a photograph or good drawing of your model, together with any explanations that you think necessary, although the latter should be made as brief as possible.

You may use any Outfit or number of parts. The first prize in each section will be awarded to the competitor who builds the crane that the judges decide to be the best model entered in that section, and the second and third prizes will be awarded to the second and third best models, and so on. It is wise to remember that very often the simplest and most straight-forward models are better than the most complicated structures.

IMPORTANT. The following instructions should be followed closely. Write your name and address on the back of each photograph or sheet of paper used, and state your age, name of the competition, and section in which your model is entered. Address the envelope: "Crane Competition," Meccano Ltd., Binns Road, Liverpool.

Do not send models. A clear photograph or good drawing is all that is necessary. Photographs or drawings will be returned if desired, providing a stamped-addressed envelope of the necessary size is enclosed with the entry.

"NO. 5 OUTFIT" COMPETITION

In this competition, which is the last of the "Outfit" series, we are offering prizes for the best models made entirely from a No. 5 Meccano Outfit. Models comprising parts that do not appear in this outfit will be disqualified. It is not necessary to use all the parts contained in the outfit.

Those boys who possess larger sets need not abstain from competing, for their entries are eligible providing only those parts which may be found in the No. 5 Outfit are used.

An interesting feature of the contest is the fact that all competitors will be using a similar number and variety of parts.

Entries will be divided into the following sections:—
SECTION A, for boys under 12 years of age.
SECTION B, for boys over 12 years of age.
SECTION C, for boys residing overseas.

Prizes will be awarded for the best entries FROM EACH SECTION as follows:
FIRST PRIZE: Meccano or Hornby Goods to the value of £2-2s.
SECOND PRIZE: Meccano or Hornby Goods to the value of £1-1s.
THIRD PRIZE: Meccano or Hornby Goods to the value of 10/6.

Other competitors whose entries show outstanding merit will be presented with complimentary copies of "Meccano Standard Mechanisms," while, in addition, a few special Certificates of Merit will be awarded at the judges' discretion for models that closely approach prize-winning standard.

Closing dates for Sections A and B: 31st May, 1926. Overseas Section, 31st August, 1926.

IMPORTANT. These instructions should be followed closely. Write your name and address on the back of each photograph or sheet of paper used, and state your age, name of the competition, and section in which your model is entered.

Address envelopes: "No. 5 Outfit Competition," Meccano Ltd., Binns Road, Liverpool.

Models should not be sent. A clear photograph or good drawing is all that is necessary. Photographs or drawings will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry.



Contents of No. 5 Outfit

16	of No.	1	2	of No.	19	3	of No.	45	6	of No.	90
26	"	" 2	4	"	" 19A	4	"	" 46	3	"	" 94
4	"	" 2A	2	"	" 19B	1	"	" 47	2	"	" 95
12	"	" 3	8	"	" 20	2	"	" 47A	2	"	" 96
8	"	" 4	2	"	" 21	2	"	" 48	1	"	" 98
36	"	" 5	4	"	" 22	10	"	" 48A	4	"	" 99
4	"	" 6	3	"	" 22A	6	"	" 48B	7	"	" 100
6	"	" 6A	3	"	" 23	4	"	" 48D	2	"	" 102
14	"	" 8	2	"	" 24	1	"	" 50	2	"	" 103F
4	"	" 8A	3	"	" 26	4	"	" 52	2	"	" 108
4	"	" 9	2	"	" 27A	2	"	" 52A	1	"	" 109
1	"	" 9D	1	"	" 28	5	"	" 53	3	"	" 111
12	"	" 10	2	"	" 29	3	"	" 54	2	"	" 115
8	"	" 11	1	"	" 32	1	"	" 56	1	"	" 116
36	"	" 12	2	"	" 34	2	"	" 57	4	"	" 125
4	"	" 12A	18	"	" 35	13	"	" 59	5	"	" 126A
2	"	" 13	1	"	" 36	4	"	" 61	1	"	" 128
1	"	" 13A	1	"	" 36A	2	"	" 62	2	"	" 130
3	"	" 14	175	"	" 37	6	"	" 63	1	"	" 134
4	"	" 15	24	"	" 38	1	"	" 65	1	"	" 147
5	"	" 15A	6	"	" 40	1	"	" 70	1	"	" 148
5	"	" 16	2	"	" 41	2	"	" 77			
5	"	" 17	1	"	" 43	1	"	" 80A			
4	"	" 18A	1	"	" 44	4	"	" 89			



The Secretary's Notes

From reports I have received it is evident that many clubs have already done a great deal towards arranging a programme of outdoor activities for the Spring and Summer months. Some clubs appear to have made no move in this direction however, and apparently they are waiting until the longer and warmer days actually arrive. Such a policy is extremely unwise and I strongly advise the newer clubs that are approaching their first Spring and Summer sessions to tackle the matter immediately and in earnest. Year after year I have received sorrowful communications from club secretaries bewailing the fact that, owing to delay in arranging their outdoor programme, they have found it impossible to accomplish half as much as they intended. The importance of early preparation is perhaps greatest in the case of clubs that intend to run a cricket team. The old saying, "First come first served," applies with particular force in this connection, and a team that gets to work early is almost certain to get more and better fixtures than one that waits until the cricket season is actually at hand.

The Outdoor Season

It is a comparatively easy matter for a large club to plan out a comprehensive outdoor programme because it has sufficient members to carry out a great variety of schemes. The position is much more difficult, however, for small clubs. There are many clubs whose membership does not permit of the formation of a cricket team or even of a cycling section, and there is a danger that the Leaders of these clubs may come to the conclusion that it is not worth while to try to struggle on through the Summer and that the best plan is to close down until the first Winter session arrives. I admit that in a few cases local circumstances make it practically impossible to carry on throughout the Summer, but as a general rule it is not only possible but profitable to have regular meetings throughout the long days, although perhaps at less frequent intervals than during the Winter. One of the simplest and yet most effective methods of keeping a small club in being is the arrangement of a series of rambles in the neighbourhood. It is important, however, that these rambles should be carefully planned beforehand, because nothing wearies the average boy so much as an aimless walk from one place to another and back again.

A Hint for Small Clubs

A year ago I suggested in these notes that rambles of this kind could be made extremely popular if the Leader gave a little time to the study of the history of the neighbourhood and, after planning a ramble to pass certain points of interest, told the story of this place or that to his members in a chatty manner as they strolled along. An old house, for instance, is simply an old house to the average boy and he will pass it by with scarcely a glance. If that house happens to have been the scene of some interesting or even thrilling event fifty, a hundred or more years ago, the informal telling of the story will rouse keen interest in almost every boy. He looks upon the old building from a fresh standpoint altogether and once his interest is thoroughly aroused it does not readily decline. As an alternative to this kind of talk, many Leaders are able to keep their little company of members thoroughly interested in chats on botany, geology, birds, etc.

Walks and Talks

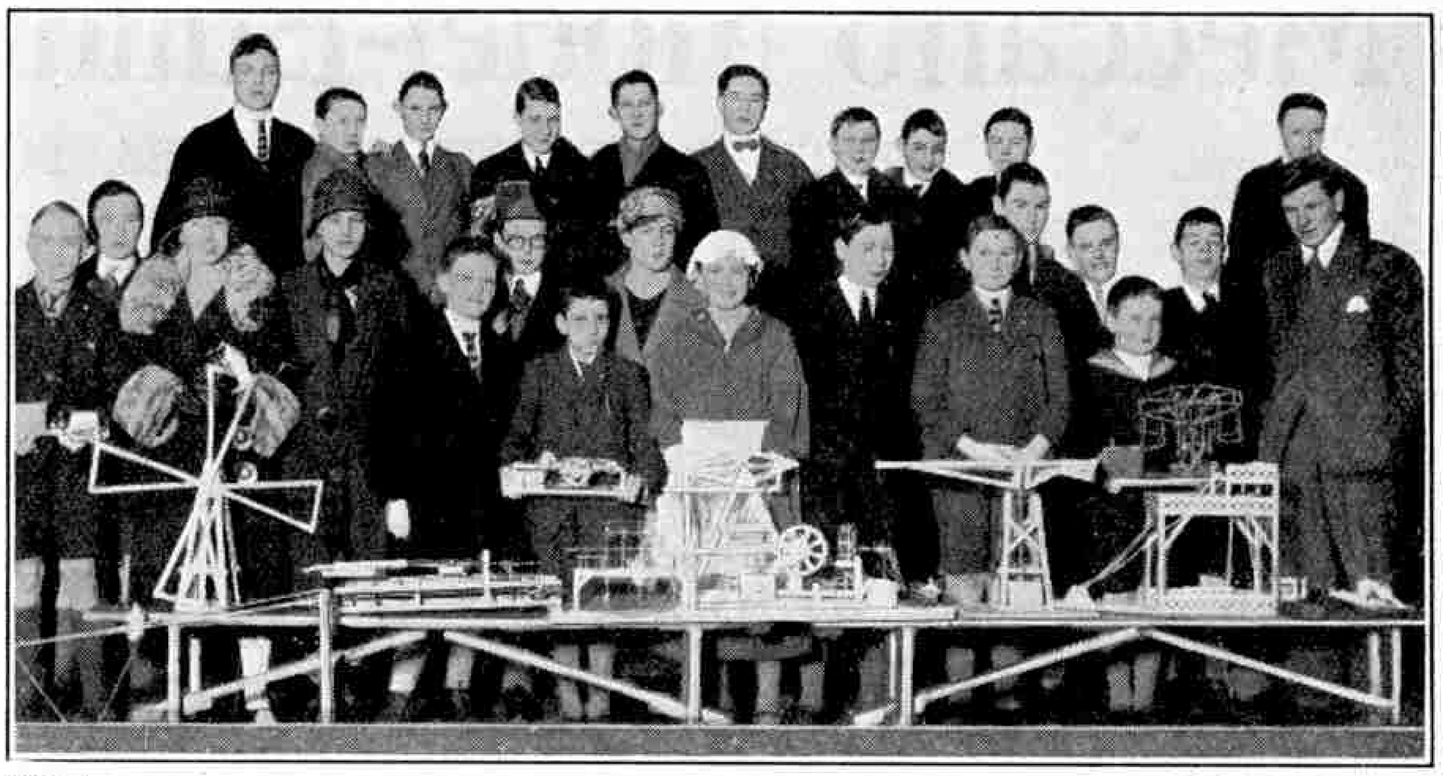
A book that will be of interest and value to club Leaders and secretaries has been compiled by Mr. J. W. Haynes of "Fontmell," Covers Road, Claygate, Surrey, Leader of the Claygate Juvenile Club. The book gives a detailed account of the formation of the club in 1919 and its progress up to the present time. From a very modest beginning with meetings of a few boys in Mr. Haynes' home, the club has grown and developed steadily and rapidly. In 1921 a girls' section was incorporated under the guidance of Mrs. Haynes. The Claygate Club is now one of the most successful in the country, its membership numbering well over 70. Copies of this book may be obtained from Mr. Haynes for 7d. post free.

A Club History

Since my announcement of the new Brooch Badge I have received many letters from girl members enquiring whether they could exchange their old badges for the new type. I am quite willing to arrange this, and any girl member who sends me her old badge will receive a brooch badge in exchange, free of charge.

The New Badge

Davenport (Stockport) M.C.



Photo] [*H. Clarke, Stockport*

Our photograph shows the interesting collection of models brought together by the Davenport (Stockport) Meccano Club at its recent exhibition. This effort met with very gratifying success and afforded ample evidence of the enthusiasm of the members and the enterprise of the Leader, Mr. A. Johnston, and the secretary, A. D. Stoker. The club celebrates its third anniversary on the 18th of this month.

"The Guild Secretary as I Imagine Him to Be!"



Prize-winning sketch by N. Edgar, Blaydon-on-Tyne

(It isn't a bit like me, really!—Sec).



CLUB NOTES

Southport M.C.—Has just become affiliated with the Guild. It is conducted by Scoutmaster W. E. Bowker in connection with the 8th Southport Troop of Boy Scouts and has been in existence for twelve months, during which time 50 meetings have been held. Chief activities are Lectures on various Engineering Subjects and the study of Special Models. Hornby Train nights, Stamp-collecting, Fretwork and Sports meetings have proved very popular. The members of Blackburn M.C. were recently entertained to games and tea at headquarters, an event which was greatly enjoyed by both clubs. Club roll: 20. *Secretary*: E. Williamson, Delamere Road, Ainsdale, Southport.

Stockton-on-Tees M.C.—Is making good progress, a further increase in membership being reported. A recent Lecture on "The Railway Centenary" was very successful, slides being loaned by the L.N.E.R. The meeting night has been changed to Monday, and at the first meeting on the new night an interesting address was given by the President, Mr. T. W. Richardson. Club roll: 19. *Secretary*: N. Middleton, 14, Victoria Avenue, Norton Road, Stockton-on-Tees.

Royal Grammar School (High Wycombe) M.C.—A new system whereby a model is loaned from Headquarters once a month is proving very popular and the boys find the study of an advanced model a welcome change from the usual routine of model-building. Recently the Horizontal Engine and Transporter Bridge models have been loaned. Unfortunately the Secretary has been ill and unable to attend. Club roll: 57. *Secretary*: H. R. Foden, Royal Grammar School, High Wycombe, Bucks.

Rosyth M.C.—Unfortunately the time for disbandment has arrived. The Royal Dockyard has closed down, and many families have been transferred to other towns. To use the secretary's own words: "Rosyth is now a town of empty houses. The streets are blocked with removal vans sent from all over Britain." It is unfortunate that such a splendid club has met with this fate and we all wish its members success in their new surroundings. *Secretary*: E. T. Hunter, 79, Admiralty Road, Rosyth, Fife.

Herne Bay M.C.—Is preparing its stand for the local Horticultural Society's Spring Show and Trade Fair, for which a working model is being loaned from Headquarters. One page in the show schedule has been devoted to the club. Games Tournaments are still a popular feature of the syllabus, in which Model-building and Hobbies Nights also figure prominently. Club roll: 30. *Secretary*: C. W. Russell, 4, Clifton Villas, Herne Bay.

Withington M.C.—An interesting lecture on "A journey to Cromer" was recently given by E. Launsbury, and Mr. Cradduck, the Leader, lectured on "The Story of London's Underground Railways" which, illustrated by slides loaned by the railway company, was a very great success. Further attractions have been a Hat Night, a Games Night, a visit to Barton Aqueduct and a special Hornby Train evening. Club roll: 8. *Secretary*: Kenneth Cradduck, 36, Mauldeth Road, West, Withington, Manchester.

Accrington M.C.—A very successful Train Evening was recently enjoyed, members bringing their train sets and combining to make an elaborate layout. A Story Evening was given by a club patron, Mr. Challenor, and a "Surprise Evening" was prepared by Mr. Hargreaves, the Leader, on which occasion he took all his members to the local cinema. A Cricket Team is to be formed. Club roll: 12. *Secretary*: Robert W. Rush, 11, King's Road, Accrington.

Nottingham Y.M.C.A. M.C.—This recently affiliated club is progressing well. It was originally conducted in conjunction with the Y.M.C.A. Aeroplane-building class. A good equipment of Meccano parts has been purchased and the membership is steadily increasing. *Leader*: Mr. Wheeldon, Y.M.C.A., Mansfield Road, Nottingham.

Ruthin M.C.—Has a Chairman, secretary, and a committee of seven members elected by the whole club. Model-building evenings are popular and all members read the "*Meccano Magazine*." A play is being rehearsed for the end of the session. Club roll: 20. *Secretary*: M. M. Marshall, Ruthin School, Ruthin, N. Wales.

Harrogate and District M.C.—This newly-affiliated club promises to be highly successful. An Exhibition of Models is being planned to take place shortly. The local Friendly Societies' Hall is the club room and new members will receive a cordial welcome. Club roll: 8. *Secretary*: R. Spellman, 36, Victoria Avenue, Harrogate.

South Park M.C.—A Lantern Lecture entitled "Business Life on the L.M.S.," loaned by that railway company, furnished a very attractive evening's programme. In the syllabus, which is very interesting, Model-building features largely, and a debate on "Electricity versus Gas as a National Help" proved very absorbing. The last function of the session was a club tea, which was greatly appreciated. Club roll: 35. *Secretary*: S. R. Steele, 20, Ripley Road, Seven Kings, Ilford, Essex.

Ilfracombe M.C.—A Mock Trial recently proved highly successful and another enjoyable evening was spent in members drawing subjects from a hat and speaking for a given length of time. Among the subjects were Meccano, Football, Wireless, Motor Cars and Fishing. A Model Competition for members aged twelve and under is being organised and three good prizes are offered. A Concert is being rehearsed for the end of the session. Club roll: 33. *Secretary*: T. Blackmore, 23, Shaftesbury Road, Ilfracombe.

Marsh Street Conway M.C.—A very interesting talk was recently given by the Leader, Mr. Gandy, on "Cables and Their History." A novel Model-building Competition has been held, the members studying for five minutes a model constructed with a No. 0 Outfit, and then being required to build it from memory. The model was built completely and accurately in the time allowed—seven minutes—by E. Pinnington. The club has been divided into eight sections, Library, Fishing, Naturalist, Philately, Chess, Railway, Photography and Swimming. Club roll: 42. *Secretary*: W. O. Knight, 22, Howard Road, Walthamstow.

Meccano Club Leaders

No. 26. Mr. W. F. Cross



Mr. W. F. Cross is Leader of St. Mark's Meccano Club, London, S.E.6, which was affiliated with the Guild in January 1924. This club has made consistently good progress and Mr. Cross has succeeded in developing among its members a spirit of initiative and enterprise, resulting in extremely interesting meetings. Few Meccano clubs tackle Shakespeare, and it was interesting recently to find this club carrying out a reading of three acts of "*Twelfth Night*." The exhibitions of models held from time to time have proved very successful and a library started a short time ago already numbers over 50 volumes and is growing steadily.

Mr. Cross is a strong believer in variety in a club syllabus, as may be gathered from our reports of the proceedings of the St. Mark's Club, and recently he has interested his members in boxing, with very successful results.

Middlesbrough M.C.—An exhibition is to be held for which models are being loaned from Headquarters. At a recent meeting Mr. A. R. Desmond, a well-known Middlesbrough lecturer, gave an interesting discourse on "Life in a Caravan," which was greatly enjoyed and appreciated. The membership has steadily increased since Mr. T. D. Allick took over the Leadership. Club roll: 23. *Secretary*: A. Bradley, 24, Laurel Street, Middlesbrough.

St. Mark's (London, S.E. 6) M.C.—A debate on "Should Picture Houses open on Sundays" aroused great interest. Another club night novelty was the reading of three acts of Shakespeare's "*Twelfth Night*." A Club Tea, postponed from last session, was a very enjoyable function held recently. Club roll: 22. *Secretary*: Geo. C. Green, 21, Hafton Road, Catford, London, S.E. 6.

Wyggeston Boys' M.C.—The leader, Mr. Reynolds, recently gave a very interesting cinema show, the films including "The Cormorant Catching Fish" and "Ski-ing in Switzerland," which were particularly good. A Lecture was delivered by G. W. Darby on "Special Railways." The membership is steadily increasing and two meetings are held each week, one being devoted to Games and similar attractions and the other to Model-building and Lectures. Club roll: 51. *Secretary*: G. W. Darby, 30, Kimberley Road, Leicester.

St. Saviour's (Tonbridge) M.C.—On a recent Visitors' Night the superintendent of the Tonbridge Police inspected members' models, which included a Drop Hammer, Motor Lorry, Windmill and two models of the Tower Bridge. Preparations are being made for an Exhibition of Models. Club roll: 12. *Secretary*: Cyril F. Hopper, 91, Shipbourne Road, Tonbridge.

Exeter M.C.—A Hornby Electric Train has been purchased and is at present the most popular feature of the club. Sixty members were delighted by the spectacle recently afforded, when the "night mail," as they called it, was running in the dark with all its lights on. A highly successful Exhibition has just been held, lasting over three days. Between 60 and 70 models in Meccano and Fretwork were displayed and 1,400 people visited the Exhibition and were enthusiastic in their praise. Two plays were given by club members, and during the exhibition an addition to the club roll of fifteen members was made. It is interesting to note that twelve months ago there were 45 Guild Members in Exeter. There are now 207, 162 having been recruited by the Exeter M.C. Club roll: 90. *Secretary*: L. Mathews, 44, Rosebery Road, Exeter.

Winchester Avenue (Leicester) M.C.—This newly affiliated club is making sound progress. Each meeting lasts 1½ hours, commencing with a business meeting with resolutions properly moved and seconded and voted upon. Each member submits a model which is carefully considered by all present. An attendance record is kept by the secretary. A Whist Drive and a Concert are being arranged, and a Library has been formed. Club roll: 12. *Leader*: Mr. H. Turner, 85, Winchester Avenue, Leicester.

Bearwood (Birmingham) M.C.—After a temporary suspension of activities, this club has reopened with renewed enthusiasm under the Leadership of the Rev. L. Holbutt, St. Hilda's Lodge, Abbey Road, Warley Wood, Nr. Birmingham, and promises to make good progress. A club room has been secured and new members will receive a hearty welcome. Club roll: 36. *Secretary*: C. White, 72, Katherine Road, Bearwood, Birmingham.

Beverley Road (Bolton) M.C.—The membership is steadily increasing and a good programme for the new session has been arranged. An enjoyable Hornby Train night was recently held and the club Library is growing and becoming very popular. A photograph of the members is to be taken shortly. Club roll: 25. *Secretary*: Hubert Henshaw, 35, Kendal Road, Bolton.

Luton M.C.—A very good session has been spent, popular features being Model-building, Competitions, and Wireless Evenings. A Social was organised by the Leader, Mr. Burgoyne, to which every boy was requested to bring a friend, and a thoroughly enjoyable evening was spent. At the commencement of the new session a "Telephone" evening was arranged, to which we hope to refer later. Club roll: 30. *Secretary*: L. Goldsmith, 69, Tennyson Road, Luton.

Davenport M.C.—Held a fine Exhibition of Models recently in St. George's Parish Rooms, Stockport. The Mayoress of Stockport and Archdeacon Thorpe were among the many visitors. The play "Uncle Ben" that followed the display was well received. Club roll: 38. *Secretary*: Arthur D. Stoker, 124, Bramhall Lane, Stockport.

Barnetby M.C.—Mr. R. S. Watson, the Leader, informs us that the group published on page 128 of the February Magazine does not, as we thought, represent the Barnetby Meccano Club, but is as a matter of fact a school class group, including only a few of the club members. Mr. Watson has promised to have a photograph of the club taken very shortly, and we look forward to publishing this. *Secretary*: R. H. Ward, Laurel Villas, Victoria Road, Barnetby.

Harwich M.C.—An Exhibition recently organised attracted great local interest. The Mayor and Mayoress of Harwich, introduced by the Club President, the Rev. Canon A. E. Mills, R.D., Vicar of Harwich, performed the opening ceremony. The Exhibition, which lasted two days, included specimens of the work of each Club Section, comprising Raffia Work, Fretwork, Carpentry, Toy Soldier-making—boys making soldiers from lead and selling them to the public while still hot—Meccano Models, and a fine Hornby Train display. A large Model Power Station attracted considerable interest, and Meccano Models included a Roundabout, Traction Engine, a working Gramophone, Transporter Bridge, Cranes, Bridges, Motor Vans, and a large Commercial Biplane measuring 40 inches across. Prizes for the best models were presented by the Rev. L. H. Hinder, the Club Chairman. A Club Party followed the Exhibition. The Mayor made a voluntary donation of 10/– to the Party Fund, and this social event proved an unqualified success. All the responsibility was taken by local friends who gave the boys a splendid time. The Misses Muriel and Sylvia Lucas gave splendid assistance on this occasion, and also in the management of the Exhibition. Club roll: 85. *Secretary*: A. E. Ward, Osborne House, Pepys Street, Harwich.

Pinxton (Nottingham) M.C. A Lecture on "Waterloo Bridge," delivered by the secretary, was highly successful. A Concert for members only was greatly enjoyed and a Lecture on "Famous Bridges" and a Gramophone entertainment also provided interesting evenings. A "Contractor's Night," the first held by this club, was recently organised and received with the greatest enthusiasm. Club roll: 56. *Secretary*: Harold Elliott, "Ivanhoe House," The Green, Pinxton, Nottingham.

(*Continued on next page*)

Chalmer's Church (Alloa) M.C.—At meetings members build models or play such games as quoits and bagatelle, according to inclination. A very fine Lecture was recently delivered in the Church Hall by the Rev. Stevenson of Dunblane, the subject being "Palestine." Slides from photographs taken by Mr. Stevenson during his stay in Palestine were used to illustrate the Lecture, the proceeds from which were given to club funds. Another successful Lecture has been delivered by George Campbell on his holiday in Belgium, lantern slides again being used. A small Orchestra has been organised. *Secretary*: William Henderson, 13, Paton Street, Alloa.

Bromley County School M.C.—Has been revived after a temporary suspension of activities and two secretaries have been appointed, one to deal with club business exclusively and the other to attend to correspondence and report to Headquarters. Meetings are held on Friday evenings and sometimes on Tuesday evenings also. Members are very enthusiastic and an interesting summer syllabus, in which outings play a prominent part, has been arranged. Club roll: 13. *Secretaries*: W. A. Googe and E. W. Dunford, 74, Havelock Road, Bromley, Kent.

Westcliff & District M.C.—Is progressing well in view of serious handicap in the illness of the Leader, Mr. A. D. Cecil. It is hoped that Mr. Cecil will soon be quite well again. L. Jones recently won a prize for his Loom Model entered in a Meccano competition and had the distinction of a special mention and his photograph in the "*Southend Times*." *Secretary*: D. S. Cecil, 22, Valkyrie Road, Westcliff.

Victoria (Glasgow) M.C.—Model-building is the chief and favourite club-night feature. Recently stories were loaned from Headquarters and read aloud to members while Model-building was in progress. According to report, some of the members abandoned work to concentrate on the story, while the remainder concentrated on model-building and were unable to follow the story properly, thus proving that even Meccano boys cannot do two things at once *Secretary:* Robert White, 22, George Street, Scotstoun, Glasgow.

Liscard High School M.C.—Consistently good progress is being made, the membership showing an increase. The last session opened with a Display of Models, followed by a Lecturette by Mr. R. Samuel, the Leader, entitled "The Power of Silence." A Lecture on the "Raleigh" Motor Bicycle delivered by Mr. Warburton was well received, and a fine instructive evening's entertainment was supplied by Mr. G. Mercer, who heard and answered 101 questions on "Electricity." By permission of the School Headmaster and the Managers of the White Star Line, members recently inspected the liner "Cedric," and this proved a most enjoyable outing. Lectures on "Wireless" and "Flying" by capable exponents are arranged for future evenings. *Secretary:* Frank Donaldson, Liscard High School for Boys, Liscard, Cheshire.

Blagdon St. Andrew's M.C.—A recent Exhibition of Models was incorporated in the Fifth Annual Spring Show held at Bristol, Meccano competitions being organised. Ten girl members have joined the club during recent weeks and are reported to be as keen as the boys. They prepared paper flowers and other decorations which greatly enhanced the appearance of the Meccano Stall. Club roll: 32. *Secretary:* Miss K. R. Day, "Seymour Arms" Hotel, Blagdon, nr. Bristol.

South Africa

Malvern Wesleyan M.C.—The syllabus includes Model-building, Lectures, a Mock Trial, Visitors' Nights and Games. All members attended a Church Parade recently, the service being conducted by the President, the Rev. F. H. Kirkby. A visit has been paid to the "*Sunday Times*" printing works, and the 22 members present enjoyed the outing. A fifteen-mile Cycle Race was arranged but had to be postponed on account of bad weather. On Saturday afternoons Cricket, Cycling, Running and Swimming are enjoyed. H. Price, a member, deserves congratulation for a recent act of bravery. While standing at a street corner Price saw a runaway horse and van approaching. He started to run in the same direction and eventually managed to board the van from behind and secure the reins. After a severe struggle, during which one of the shafts was broken, he succeeded in bringing the frightened horse to a standstill. Club roll: 25. *Leader*: Mr. E. Sykes, Box 54, Cleveland, Johannesburg.

India

Delhi Children's M.C.—Recent events have included a Model Display. A Steam Engine Model was exhibited by the Leader, Mr. A. P. Mitra, and its mechanism explained part by part. The President, Mr. L. Raghbir Singh, presided. Several new members have recently been enrolled and preparations are now going forward for an Exhibition of Models to be incorporated in the Delhi Baby Week celebrations. *Secretary*: R. Raman, Charkhe Walan, Delhi, India.

Italy

Siena M.C.—Weekly meetings are held and are devoted to instructive Films, Model-building, Talks on various Engineering Subjects, and Hornby Train displays. In order to maintain a regular attendance a rule has been made by which a member missing four meetings without good cause is expelled. The membership shows a gradual increase since the club's affiliation. Club roll: 9. *Secretary*: Valentino Bruchi, 39, Via Ricasoli, Siena, Tuscany, Italy.

Competition results continued from page 277.

"Bridge" Competition

In this competition, as first announced in the March "*M.M.*," we are offering splendid awards for new Meccano models of a Bridge. The competition closes on the 31st May for readers in the British Isles, and entries from overseas competitors must be received by 31st August. Meccano boys should send along their efforts as soon as they are completed.

You may fashion your model from any type of bridge that you prefer. Cantilever, arch, girder or suspension bridges will be accepted; also transporter bridges, rolling, swing, draw—and lift-bridges, etc.

Entries will be divided into the following sections: SECTION A, for competitors residing in the British Isles; SECTION B, for competitors residing outside the British Isles. Competitors' ages will be taken into consideration when judging the entries. Prizes will be awarded for the best entries FROM EACH SECTION as follows: FIRST PRIZE, £3-3s.; SECOND PRIZE, £2-2s.; THIRD PRIZE, £1-1s.; SIX prizes of 10/6 each. A number of copies of "Meccano Standard Mechanisms" will be distributed as consolation prizes, and a few special Certificates of Merit will be awarded at the judges' discretion.

When you have built your model, you should send in a photograph or a good drawing, together with any explanations you may think necessary, although the latter should be made as brief as possible. Photographs or drawings will be returned if a stamped and addressed envelope of the necessary size is enclosed with the entry. Write your name and address on the back of each sheet used, and state your age, name of the competition, and section in which your model is entered. Mark envelopes "Bridge Competition."

"No. 4 Outfit" Competition

As announced last month, we are offering prizes for the best models made entirely from a No. 4 Meccano Outfit. Models comprising parts that do not appear in this Outfit will be disqualified. It is not necessary to use all the parts contained in the Outfit. Those boys who possess larger sets may compete, providing they use only those parts that are in a No. 4 Outfit.

Models should not be sent. A clear photograph or good drawing is all that is necessary: this will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry.

Entries will be divided into the following sections:—SECTION A, for boys under 12. SECTION B, for boys over 12 and under 16. SECTION C, for boys residing overseas, and not exceeding 16 years of age. Prizes will be awarded for the best entries FROM EACH SECTION as follows:—FIRST PRIZE: Meccano Products to the value of £2-2s. SECOND PRIZE: Meccano Products to the value of £1-1s. THIRD PRIZE: Meccano Products to the value of 10/6. CONSOLATION PRIZES, consisting of complimentary copies of "Meccano Standard Mechanisms," and a few special Certificates of Merit.

Closing dates for Sections A and B: 30th April. Overseas Section, 31st July.

You should send in a photograph or a good drawing of your model, together with any explanations you may think necessary, although the latter should be made as brief as possible. Write your name and address on the back of each sheet used, and state your age, name of the competition, and section in which your model is entered. Mark envelopes "No. 4."

Overseas Closing Dates of Previous Contests

"Motor" and "No. 2 Outfit" Competitions: entries from any country outside the British Isles must reach Liverpool not later than 31st May.

"Ship" and "No. 3 Outfit" Competitions: entries from any country outside the British Isles must reach Liverpool not later than 30th June.

A Local Meccano Competition

Mr. H. W. Bacon, a well-known Meccano dealer of London Road, Thornton Heath, recently organised a successful model-building contest for the benefit of local Meccano boys. Some of the entries received show a striking originality and indicate that Thornton Heath Meccano boys possess a commendable share of ingenuity and resource.

The first prize was secured by S. J. Harmer, who submitted a clever representation of St. Paul's Cathedral. The model was roughly 4 ft. in height, 4 ft. wide and 5 ft. long. It contained a peal of six bells, capable of operation by hand, and was fitted with four or five electric lights. The second prize-winning model was built by Gordon Harris and took the form of an aeroplane race. This contained cardboard scenery painted to represent the English Channel, with the cliffs of England and France on either side. During the run from the aerodrome to the cliffs and over the "channel" the aeroplanes rose about 4 in. in the air and descended in a novel manner. They were set in motion by Pulley Wheels and cord.

F. Fox gained the third prize with a smooth-running model of a horizontal engine, the design of which was well proportioned and showed much ingenuity, and a consolation prize was awarded to Miss Audrey Purchase, the only girl entrant in the Contest, who submitted a neat little model of a perambulator.

Overseas Results

Puzzles Page Suggestions

ERNEST BOXILL (Trinidad, B.W.I.), £1-1s.-0d.

Engineering Wonders Voting

This competition proved to be one of the most popular that we have held for our Overseas readers for some months. The final order of the voting was Forth Bridge, Eiffel Tower, Assuan Dam, Panama Canal, Canadian Pacific Railways, London Tube Railways and Wembley, and it will be seen that the list bears a remarkable resemblance to the results in the Home Competition. But nevertheless only one boy succeeded in giving the correct list.

1. J. MORRIS (Chateau D'Oex, Switzerland); 2, J. A. Gomes (Bombay, India); 3. C. E. H. WARNER (Grahamstown, S. Africa); 4. DOUGLAS THORP (Ontario, Canada).

20th Photo Contest

Section A—First Prize, S. M. P. SHOTHAM (Madras, T.C., S. India); Second Prize, L. MORRISBY (Hobart, Tasmania). Section B—First Prize, B. LINCOLN (Punjab, India); Second Prize, H. TSUMURA (Tokyo, Japan).

10th Drawing Contest

Section A—First Prize, F. J. KOOT (Rotterdam); Second Prize, SENJI M. P. SAMMIE (Madras, India). Section B—First Prize, N. JOLLY (Malta); Second Prize, IAN F. CALDER (Wellington, N.Z.)

11th Drawing Contest

Section A—First Prize, M. G. MITCHELL (Auckland, N.Z.); Second Prize, R. S. ROBINSON (British Columbia). Section B—First Prize, R. A. PETTY (Johannesburg, S.A.); Second Prize, C. C. Sweet (Alberta, Canada).

Cricket or Football Essay

Section A—First Prize, T. MCKELVIE (Auckland, N.Z.); Second Prize, A. DAVEY (Western Australia). Section B—First Prize, L. FISHER (Johannesburg); Second Prize, W. F. KALER (Dunedin, N.Z.)

August Essay Contest

The judging of this competition—the subject being "The Happiest Day of My Holidays"—was a particularly pleasant task. As we read the various essays we were transported in imagination from the bustle of a busy office to sunny beaches and peaceful streams, to tropical lagoons and waving palms. We envied our lucky overseas readers!

Awards:—Section "A"—First Prize, Miss M. BOXILL (Port of Spain, Trinidad). Second Prize—E. HOLDER (Port of Spain, Trinidad).

Section "B"—First Prize, L. FISHER (Johannesburg). Second Prize, A. ROBERTSON (Wellington, N.Z.)

Best Railway Puzzle

The special prize of £1 1s. 0d. offered for the best railway puzzle was awarded to G. J. CLERIHEW, Vancouver, B.C., Canada).

Answers to Last Month's Puzzles

No. 183. The names of the books are as follows:—Julius Cæsar, Great Expectations, Civil Government, It's Never Too Late to Mend, Liberty, City of Dreadful Night, Wild Wales, Jane Eyre, Quo Vadis, The Decline and Fall of the Roman Empire, Beyond the Sea, Timbuctoo the Mysterious, Travel with a Donkey, The Desert, Walk Across Africa, Path to Rome, Two Years Ago, She, Tom Brown at Oxford, Our Mutual Friend, Old Curiosity Shop, Much Ado About Nothing, As You Like It, All's Well that End's Well.

* * * *

No. 184. "A stitch in time saves nine."

* * * *

No. 185. Calling the sons A, B and C; A had three full boxes, one box half full and three empty boxes; while B and C each had two full boxes, three boxes half full and two empty boxes.

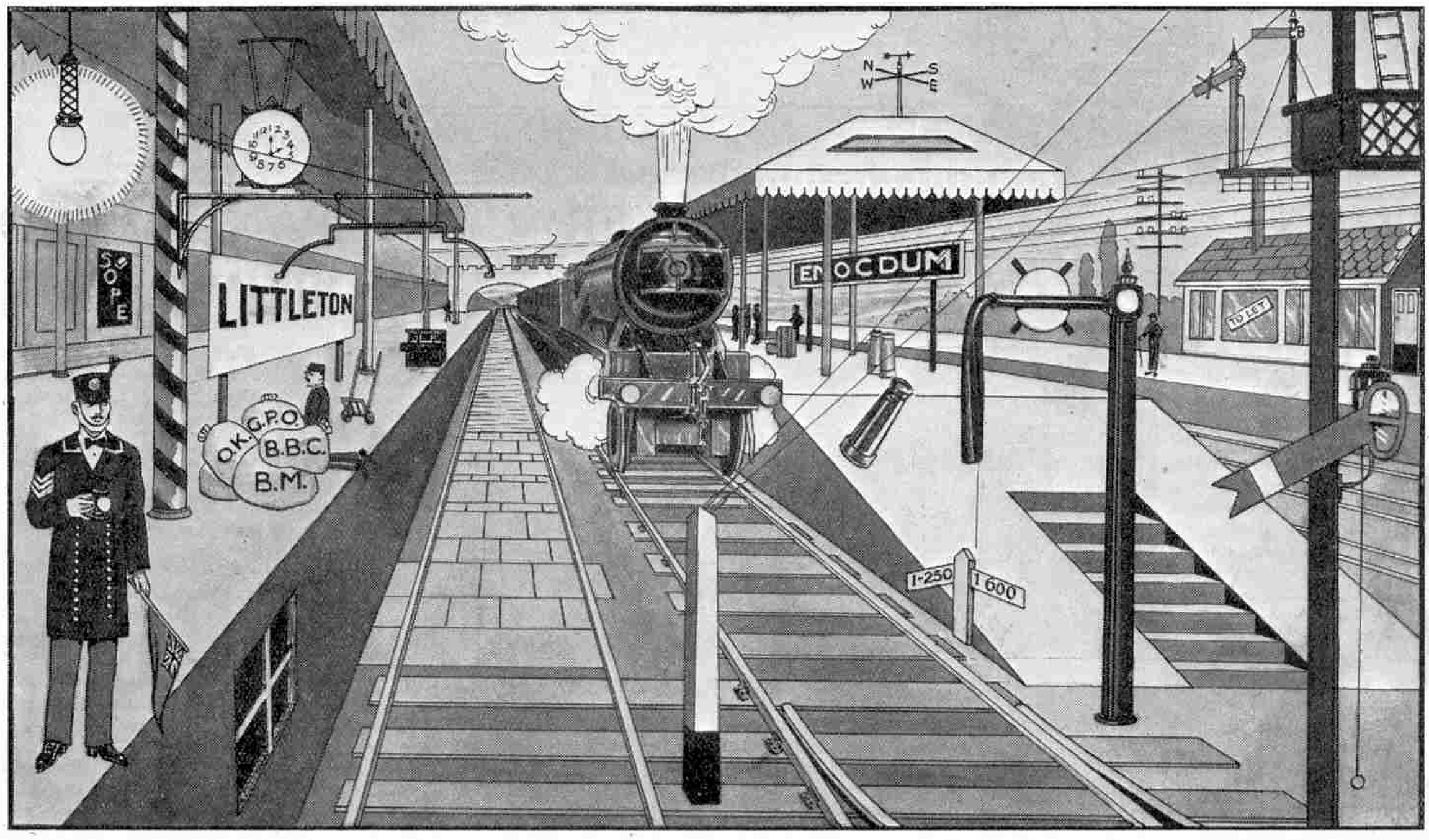
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No. 186. A Walnut.

* * * *

No. 187. The parts are (a) Train Coupling; (b) Dog Clutch; (c) Rubber Ring; (d) Flywheel; (e) Reed Hook; (f) Face Plate; (g) Rack Strip; (h) Screw Driver; (i) Eye Piece; (j) Spring Clip; (k) Bevel Gear; (l) Wire Line.

Competition Page



How Many Errors Has Our Artist Made?

We publish above the third of the new series of "Sharp Eyes" Puzzle Pictures. The conditions of this competition are familiar to most of our readers and the following notes will make everything clear to new readers.

In the above picture our artist has introduced intentionally a number of errors, and the task of competitors consists in finding and making a list of these mistakes. Competitors' lists should be written on one side of the paper only and at the foot of the list the total number of errors found should be noted. The description of the mistakes should be kept as short as possible.

Four prizes of Meccano or Hornby Train goods (to be selected by the winner) to the value of £1-1s., 15/-, 10/6 and 5/- respectively will be awarded in order of merit to the four competitors who send in the longest lists of genuine errors.

Closing date, 30th April. Overseas, 31st August.

25th Photographic Contest

Our subject this month is "A Record Photograph." By this we mean a photograph of something of interest that is worth photographing so that when it changes or passes away altogether a record of it will still remain. The scope of such a competition is enormously wide. Old and quaint buildings, curious customs and industries, ancient furniture or carving, all come under the heading, and in addition much may be done in recording the changes that are taking place continuously all over the country. In almost all our towns, buildings are being demolished in order that old streets may be widened to cope with the growth of traffic and in country districts the same process is going on on a smaller scale, as, for instance, when some interesting cottage has to be removed in order to widen a narrow piece of road or straighten out a dangerous bend.

This contest should appeal very strongly to our overseas readers and we would remind them that subjects that are very familiar to them are probably strange, and therefore of great interest, to our home readers.

Prizes of Photographic Materials (or Meccano Products) to be chosen by the winners to the value of £1-1s.-0d. and 10/6 respectively will be awarded as first and second prizes in Section A for readers of 16 and over and Section B for those under 16.

Closing date: 30th April. Overseas, 31st July.

14th Drawing Contest

Suggestions for subjects for drawing competitions continue to be submitted in considerable numbers and for this month we have chosen a subject suggested by several readers—"A Crane In Action." There is no restriction as to the type of crane and we give our readers the choice of every known variety from small hand operated machines up to huge hammerheads and other monsters. A glance through back numbers of the "*M.M.*" will provide a great deal of material for intending competitors.

The usual two sections will be maintained, A for readers of 16 and over and B for those under 16, and prizes of drawing materials (or Meccano Products) to be chosen by the winners to the value of 15/- and 7/6 will be awarded to the entries adjudged first and second respectively in each section.

Closing date: 30th April. Overseas, 31st July.

Results

13th Drawing Contest

First Prizes—Section A, R. J. Post (Chippenham); Section B, R. G. Emm (London, W.2). Second Prizes—Section A, W. Scott (Glasgow); Section B, R. W. Wickham (Brighton).

February Puzzles

1. F. H. Culverhouse (Sheffield); 2. S. Emmett (London); 3. W. A. Pearman (Shrewsbury); 4. C. E. Wrayford (Aylesbeare, nr. Exeter).

"Battle of Wits" Prize

Judging from the entries received, this novel contest made a strong appeal to our keener readers and many ingenious traps were set in the dialogues.

The prize of £1-1s.-0d. was awarded to:—C. N. Beattie (Lewes.)

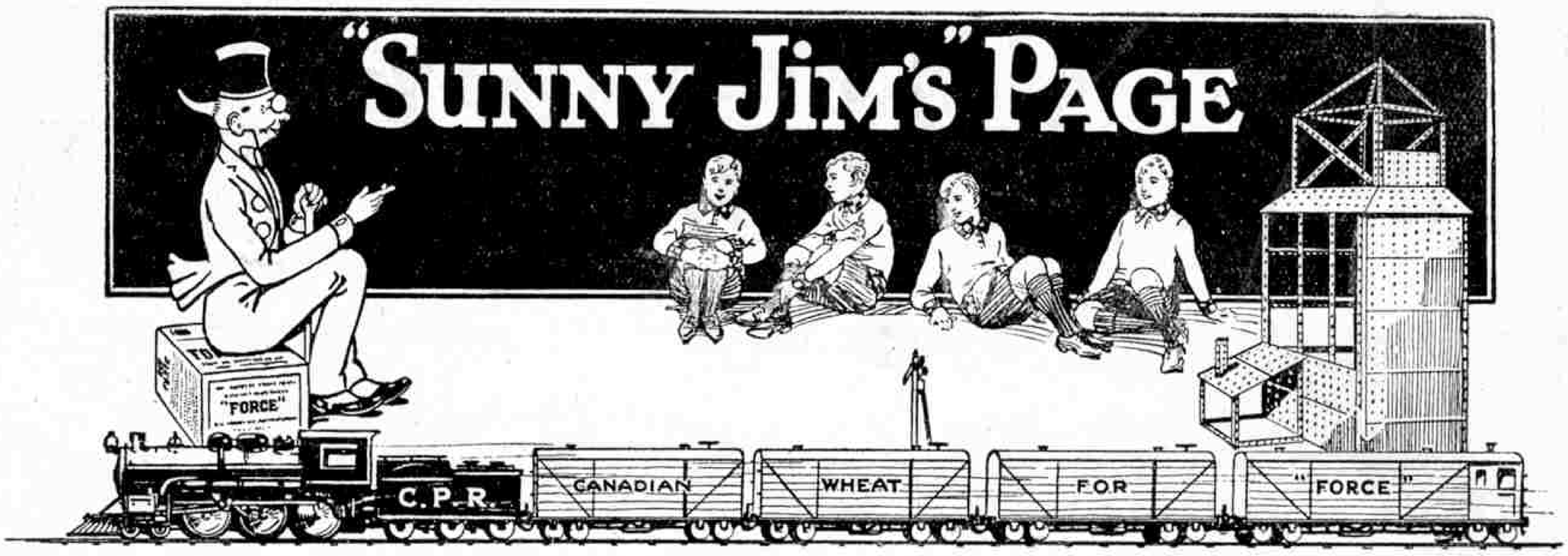
23rd Photo Contest

Section A—First Prize, P. Lambert (Harrogate); Second Prize, W. H. Evernden (Faversham). Section B—First Prize, A. H. Fletcher (Cardiff); Second Prize, G. Ross (Aberdeen).

February "Sharp Eyes" Contest

First Prize, C. F. Floyd (Bristol); Second, J. S. Hodges (Gt. Berkhamsted); Third, W. Mitchell (Exeter); Fourth, A. Sallis (Chislehurst).

Overseas Results continued on page 276)



SUNNY JIM MAKES ANOTHER (AND BIGGER) PANORAMIC MODEL OF CANADA'S WHEATLANDS (WHERE "FORCE" COMES FROM)

On the "FORCE" Exhibit at the Ideal Homes Exhibition, Olympia, London Meccano boys saw the biggest panoramic model of Canada's boundless Wheatlands I have yet made. As however, most of you live too far from London even to have thought of going to Olympia; I'll tell you what those two merry Meccano Boys, Dick and Harry, saw when they paid a visit to my Stand.

They were waiting for me just outside the doors of Olympia.

"Hullo! Sunny Jim," they cried, as I shook hands with them.

"Come on boys," I said, "this way."

We passed through the turnstile and were soon at the "FORCE" Stand.

"Oh! what a fine model," shouted Harry excitedly. It looks almost as though one could take a ride on the railway"

"I've brought my camera," said Dick. "I'll take a couple of photographs of it."

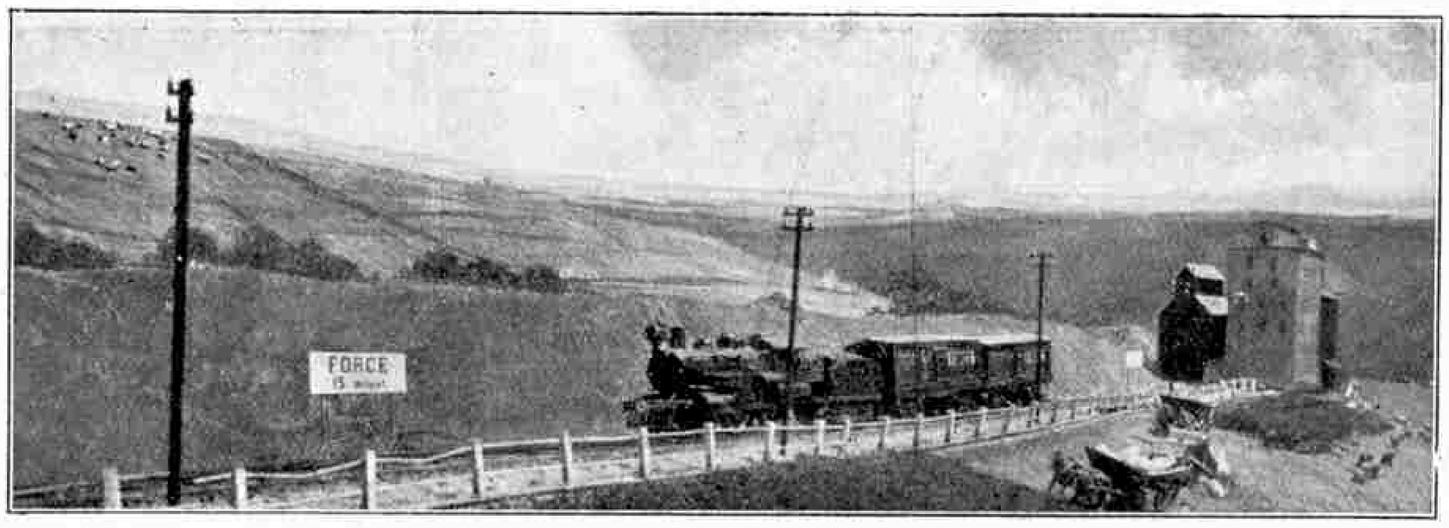
I have reproduced Dick's photographs so that, if you did not go to Olympia, you will know what the "FORCE" panorama looked like.

Dick and Harry were very much enjoying a plate of "FORCE" and fruit, when:—

"Tell us all about it," said Harry, between mouthfuls.

"Yes, do," added Dick.

"This panorama," I commenced, "is made of sacking, matting, paint, wood and glue. It is 20 feet broad and nearly 20 feet deep. It represents the huge prairie surrounding a town called Ayr, situated near the Great Lakes in Ontario, Canada. On this mighty belt of land the wheat used for "FORCE" is grown. Could you be there during the harvest which this model depicts, you could hear the "burring" of the great reapers, the droning of the threshers, the shrill whistle of the Canadian Pacific Railway engines as they rush along to the "FORCE" Mills, pulling trainloads of golden wheat."



A "Close up" view of the "O" gauge C.P.R. track

"Are all those grains of wheat made into "FORCE?" asked Dick.

"Yes, the wheat is taken to the "FORCE" Mill at Ayr (you can see the mill in the right-hand corner of the picture), where it is cleaned, then placed into huge steam cookers, and barley malt added. The grains are next rolled into flakes and toasted in electric ovens until they are crispy brown. The flakes of wheat that come out of the toasting ovens are now called "FORCE"—so you see, "FORCE" is *whole wheat*, bran and all!

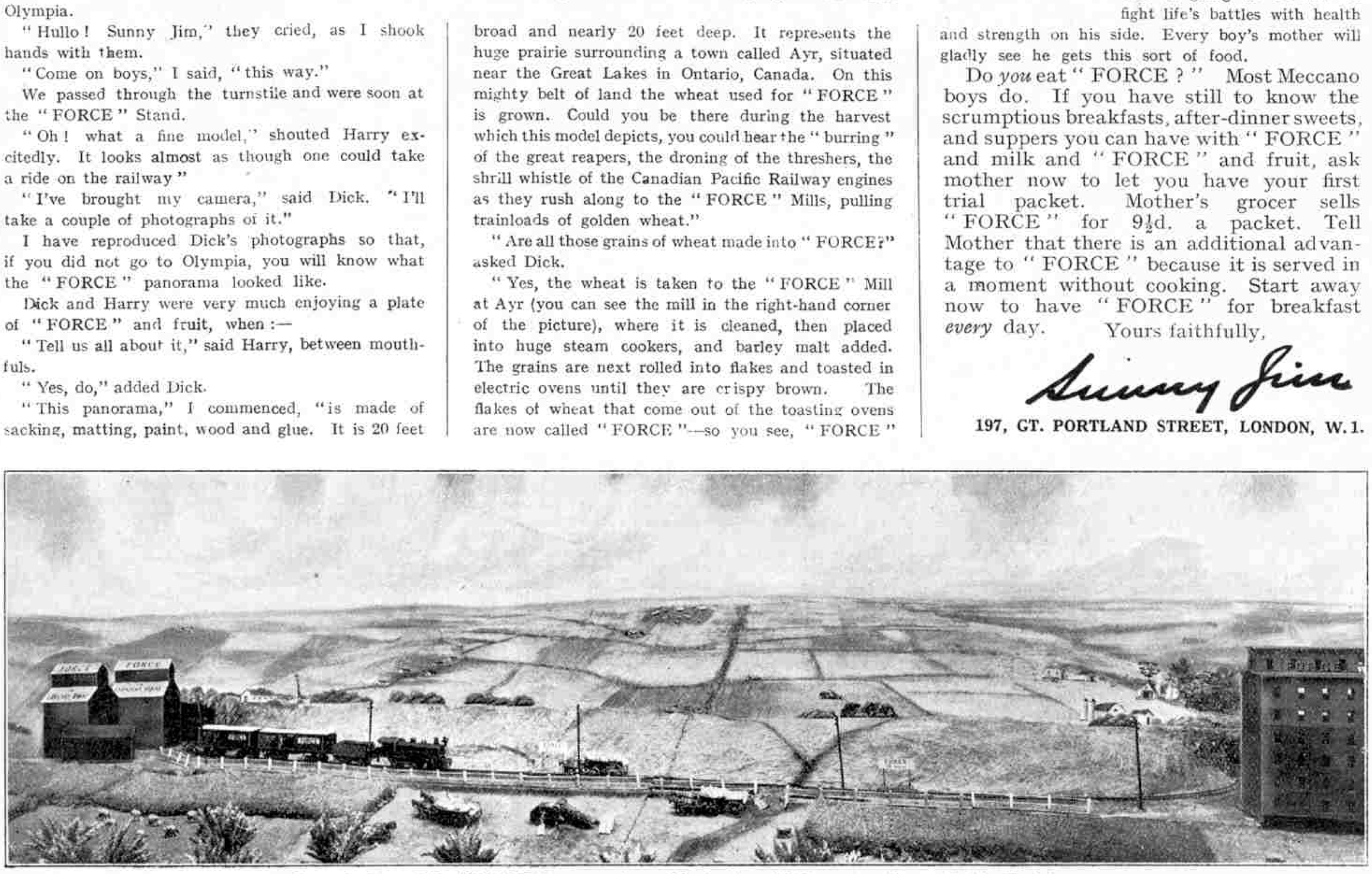
In England we call wheat Corn. "Corn" to a Canadian, is "Maize." "FORCE" is not "Corn," it is "*Wheat*," whole wheat, the finest wheat grown in the British Empire.

Wheat is the best and most nutritious food nature has given to man. In the form of "FORCE" it is most delicious and most able to do its work of building up healthy muscles and strong, virile bodies. Every boy who *is* a boy wants food that is going to fit him to fight life's battles with health and strength on his side. Every boy's mother will gladly see he gets this sort of food.

Do *you* eat "FORCE?" Most Meccano boys do. If you have still to know the scrumptious breakfasts, after-dinner sweets, and suppers you can have with "FORCE" and milk and "FORCE" and fruit, ask mother now to let you have your first trial packet. Mother's grocer sells "FORCE" for 9½d. a packet. Tell Mother that there is an additional advantage to "FORCE" because it is served in a moment without cooking. Start away now to have "FORCE" for breakfast *every* day. Yours faithfully,

Sunny Jim

197, GT. PORTLAND STREET, LONDON, W.1.



General view of the "FORCE" panoramic model showing "O" gauge railway, electrically driven



Fireside Fun

NOT QUITE WHAT HE MEANT!

A small boy who had been greatly disappointed that the long promised new baby brother had proved so helpless a thing, wrote a letter to his absent father.

"Dear Dad,—We are all quite well. Mother lets me play with baby every afternoon now, and he is now getting much more sense. Hope this finds you the same. Your loving son, Joe."

* * * *

Customer: "How do you sell your cheese?"

Grocer: "I often wonder myself, madam."

* * * *

Schoolmaster: "What is your name, my boy?"

New Pupil: "'Enry 'Obson."

Schoolmaster: "Can't you say sir?"

New Pupil: "Sir 'Enry 'Obson!"

* * * *

Guard: "You don't mean to tell me this boy is under 12."

Passenger, on very slow train: "Maybe not, but he was when the train started."

* * * *

"Mummy, why does Uncle John eat off his knife?" asked little Bobby.

"Hush dear," replied Mother in an agonized whisper. "Uncle John is rich enough to eat off the coal shovel if he preferred it."

* * * *

POOR DAD!

A teacher in the East end of London received the following letter from the Mother of one of his pupils.

"Dear Sir,—Please do not give Charlie any more homework. That sum about 'How long would it take a man to walk forty times around Trafalgar Square?' caused his father to lose a whole day's work; then when he walked it you marked the sum 'wrong.'"

* * * *

Q. Why is a mouse like hay?

A. Because the cat'll (Cattle) eat it.

* * * *

First Passenger: "Doesn't that man eat a lot of food?"

Second Passenger: "Yes, I think he's one of those men they call a stowaway."

* * * *

"What splendid binoculars," a man said to his friend. "Yes," said the owner proudly, "they are so powerful that when I look at the next village the church appears to be so near that I can almost hear the organ playing."

This Month's Short Story

The tomb of an old Potentate,
In the East was discovered of late,
And there, do you know,
Was the word 'Meccano,'
Inscribed on his engine of State.

* * * *

Tommy had been playing cricket for his form eleven, and upon arrival home was describing the match to his aunt.

Tommy: "Yes, aunt, and what do you think, I took seven wickets for 40 runs."

Aunt: "Thomas! Don't exaggerate. I know perfectly well that there are only six wickets."

* * * *



Move along there!

Small boy: "Will you go in there for me, mister?"

Constable: "What for?"

Small boy: "I want a catalogue and the advert said 'send a P.C.'"

* * * *

THAT BORED HOME!

A Londoner who had had an American staying with him for some weeks had become very tired of his visitor's tall stories, but when they were caught in the midst of a very dense London fog, his turn came at last.

American: "Say, I guess this is some mist."

Londoner: "Oh, no, nothing extraordinary."

American: "But how do the automobiles get along?"

Londoner: "Oh, the first car makes a tunnel and the remainder follow it through."

* * * *

Teacher: "Find the lowest common denominator ——"

Willie: "Goodness, is that thing lost again?"

ONE FOR PAT!

An extremely bald headed American tourist while touring in Ireland met a rustic, ambling along a road. Pat possessed a great shock of untidy hair and the American, thinking to take a rise out of him, said, "Pat, have you never heard that brains and hair do not go together?" "Sure, and I haven't," replied Pat, "But I have often heard it said that an empty barn requires no thatch."

* * * *

Policeman (Producing note book): "Come along my lad, what is your name?"

Motorist: "Aloysius Alastair Cholmondeley Cyprian ——"

Policeman (Putting book away in a hurry): "Well, don't let me catch you again."

* * * *

"Have you chanced to see a fox terrier, my lad?"

"Small black and white one, Sir?"

"Yes."

"With ears stuck up?"

"Yes."

"With a very short nose and stumpy tail?"

"Yes, that's it."

"No, I ain't seen him mister, but I knows the sort you means."

* * * *

Tourist: "Why don't you buy a cycle?"

Farmer: "I would rather buy a cow."

Tourist: "Huh! you'd look funny riding a cow!"

Farmer: "Not half so funny as you would look trying to milk a bicycle."

* * * *

Mother: "What are you playing with, Tommy?"

Very small son: "A caterpillar and two little kittenpillars."

* * * *

DIFFICULT!

A visitor had told Tommy that his work was in Switzerland for the famous firm of Nestlé. Tommy was greatly interested. "Do you have to mind the cows?" he asked. "No, not exactly," was the amused reply. "I expect it must be awfully difficult work," continued Tommy, "Is it not very hard to make the cows sit on those little tins?"

* * * *

Three little girls were discussing the merits of their respective fathers.

Said one, with a proud look, "My father is a poet, he just writes a few lines and gets £5 for them."

The second girl said, "Oh that's nothing, my father is a painter and gets £100 for each picture."

With a glow of triumph the third opened wide her mouth and with a glance of scorn retorted, "My father is a parson; he gets up in the pulpit, says a few words, and then it takes ten men with bags to carry the money."

ROLLING STOCK AND ACCESSORIES

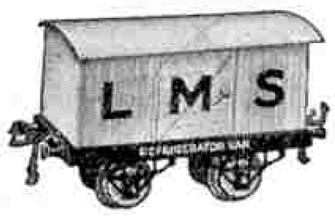
(HORNBY SERIES)

There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of the Hornby series. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Hornby Trains are British made, and your dealer will be able to show you specimens of the new products.



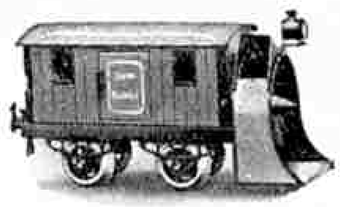
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



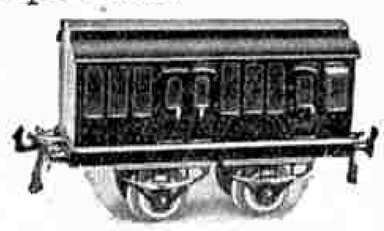
***REFRIGERATOR VAN**
Enamelled in white, with opening doors. Price **4/-**



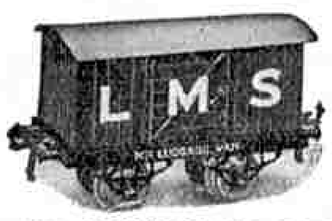
BRAKE VAN
Finished in grey, with opening doors. Price **4/-**



***SNOW PLOUGH**
With revolving plough driven from front axle. Price **5/6**



***GUARD'S VAN**
Realistic design, fitted each side with opening doors. Price **3/6**



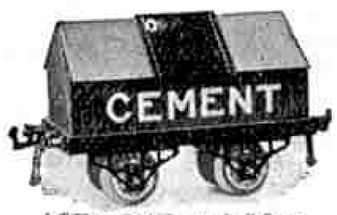
***No. 1 LUGGAGE VAN**
With opening doors. Price **4/-**



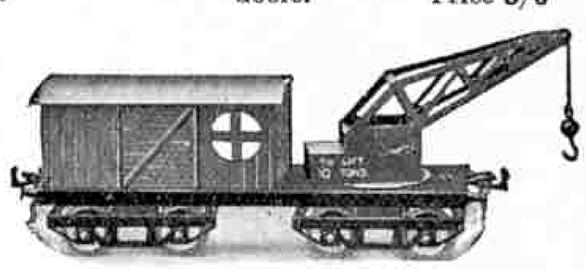
***No. 2 LUGGAGE VAN**
Finished in blue and green. Fitted with double doors. Suitable for 2-ft. radius rails only ... Price **6/6**



***MILK TRAFFIC VAN**
Fitted with sliding door, complete with milk cans. Price **4/6**



CEMENT WAGON
Finished in grey and black. Price **4/-**



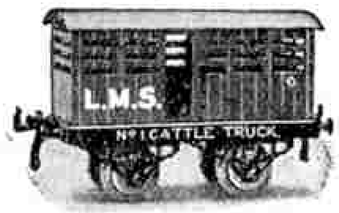
***BREAKDOWN VAN AND CRANE**
Beautifully coloured in grey and black, with opening doors. Suitable for 2-ft. radius rails only ... ... Price **7/-**



SECCOTINE WAGON
Beautifully finished in blue, with opening doors. Price **4/-**



***No. 2 CATTLE TRUCK**
Splendid model fitted with double doors. Suitable for 2-ft. radius rails only ... ... Price **6/6**



***No. 1 CATTLE TRUCK**
Fitted with sliding door. Ver realistic design Price **4/-**



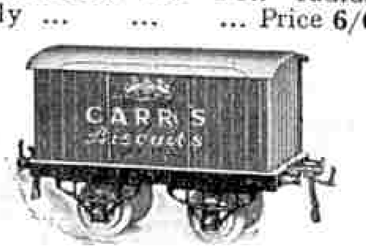
SIDE TIPPING WAGON
Excellent design and finish. Price **3/6**



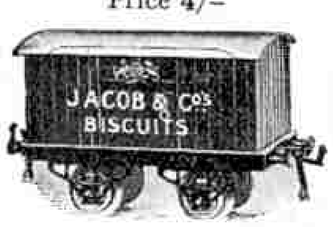
ROTARY TIPPING WAGON
Finished in grey and green. Price **4/-**



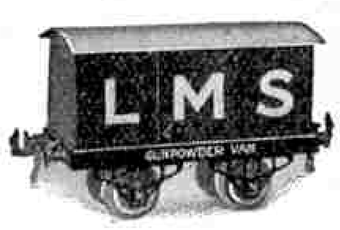
CRAWFORD'S BISCUIT VAN
Finished in red, with opening doors ... Price **4/-**



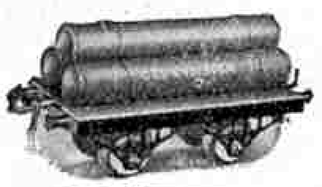
CARR'S BISCUIT VAN
Finished in dark blue, with opening doors. Price **4/-**



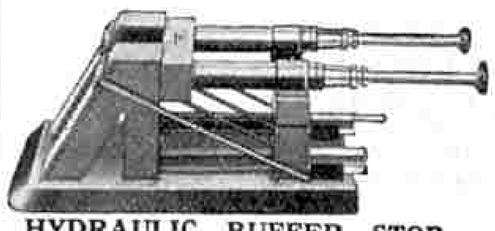
JACOB'S BISCUIT VAN
Finished in crimson lake, with opening doors, Price **4/-**



***GUNPOWDER VAN**
Finished in red, with opening doors. Price **4/-**



***GAS CYLINDER WAGON**
Finished in red, lettered gold. Price **3/-**



HYDRAULIC BUFFER STOP
Price **5/-**



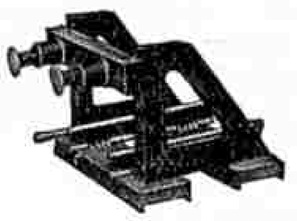
PETROL TANK WAGON "SHELL"
Finished in red. Price **3/-**



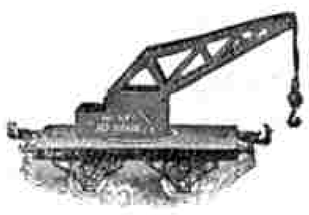
PETROL TANK WAGON "PRATTS"
Finished in green. Price **3/-**



MOTOR SPIRIT TANK WAGON "NATIONAL BENZOLE"
Price **3/-**



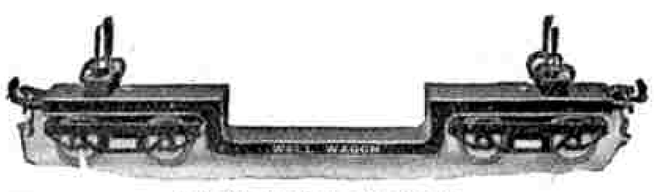
SPRING BUFFER STOP
Price **1/6**



***CRANE TRUCK**
Finished in grey and black ... Price **4/6**



***HOPPER WAGON**
Mechanically unloaded. Finished in grey and black ... Price **4/-**



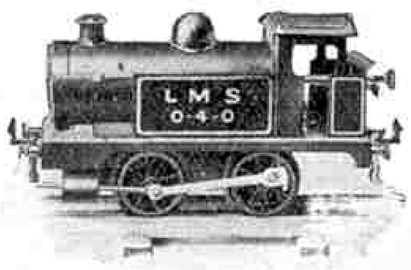
***TROLLEY WAGON**
Finished in grey and red. Suitable for 2-ft. radius rails only ... Price **6/-**



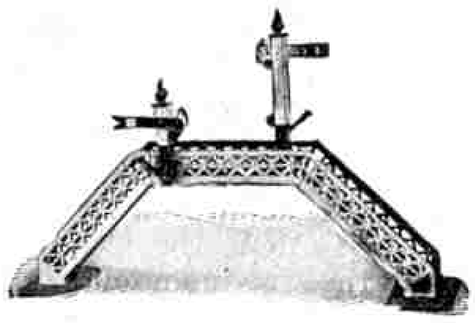
TURNTABLE
Price **5/-**



TUNNEL
Realistic and finished in colours ... Price **7/6**



HORNBY No. 1 TANK LOCO
Gauge 0, in colours to represent L.M.S. or L.N.E.R. Companies' locos. Price **12/6**



FOOTBRIDGE
No.1. With detachable Signals Price **6/-**
No. 2. Without Signals ... ,, **3/6**
Signals only ... ... per pair **2/9**

**Lettered L.M.S. or L.N.E.R.*



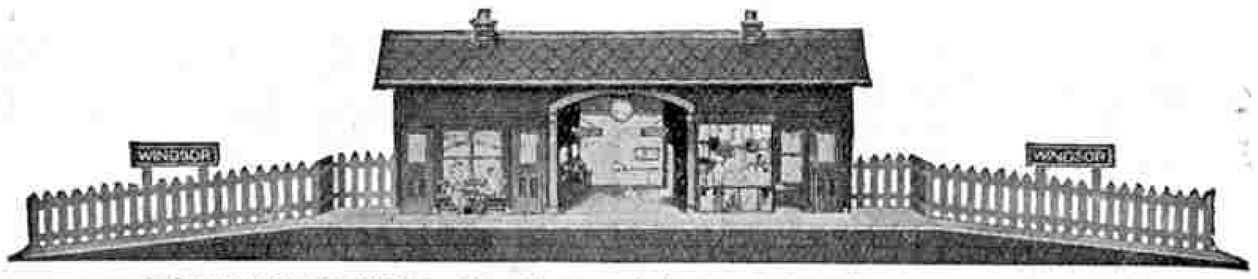
HORNBY No. 2 TANK LOCO
Beautifully finished in colours to represent L.M.S. or L.N.E.R. Companies' locos. Fitted with reversing gear, brake and governor. ... ... Price **30/-**

ROLLING STOCK AND ACCESSORIES

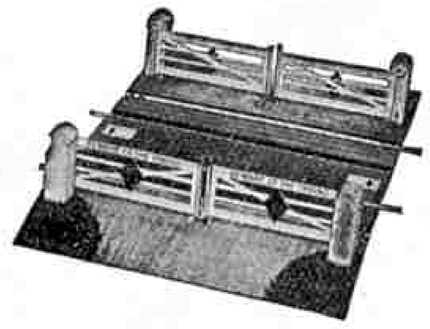
(HORNBY SERIES—*continued*)



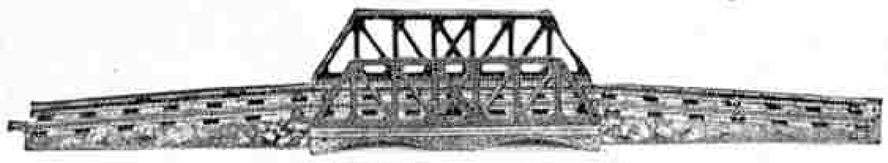
SIGNAL CABIN
Dimensions: Height 6½ in., Width 3½-in., Length 6½-in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired.
Price **6/6**



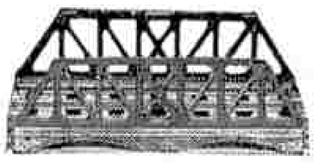
RAILWAY STATION. Excellent model, beautifully designed and finished. Dimensions: Length 2-ft. 9-in., breadth 6-in., height 7-in. Price **12/6**



LEVEL CROSSING
Beautifully designed in colour. Measures 11½ × 7¼-in. with Gauge 0 rails in position.
Price **6/6**



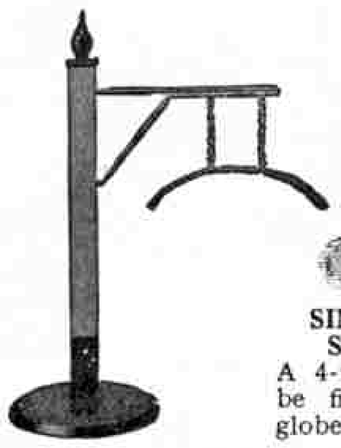
VIADUCT. Price **7/6**
ELECTRICAL VIADUCT. Price **8/-**



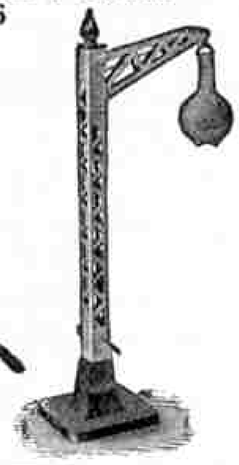
VIADUCT (Centre Section only) Price **4/6**
ELECTRICAL VIADUCT (Centre Section only) Price **5/-**



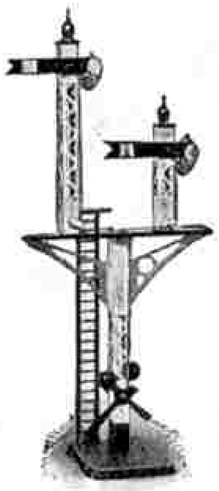
DOUBLE LAMP STANDARD
Four-volt bulbs may be fitted into the globes.
Price **4/-**



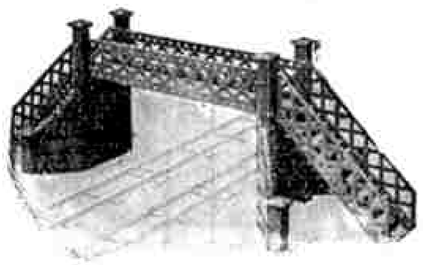
LOADING GAUGE
Price **1/9**



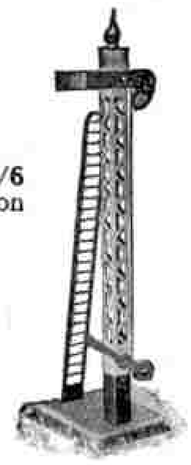
SINGLE LAMP STANDARD
A 4-volt bulb may be fitted into the globe. Price **3/-**



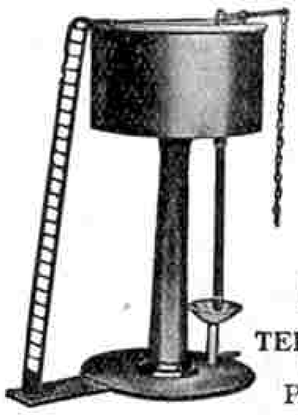
JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14-in. in height.
Price **5/6**



LATTICE GIRDER BRIDGE
Constructional type. Strong and well proportioned.
Price **10/6**



SIGNAL
Price **2/6**



WATER TANK
Brightly coloured in red, yellow and black, 8½-in. in height, with flexible tube and pump lever.
Price **6/6**



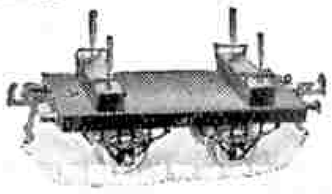
TELEGRAPH POLE
Price **2/6**



***No. 2 TIMBER WAGON**
Beautifully enamelled in green. Suitable for 2-ft. radius rails only ... ... Price **4/6**



No. 1 TIMBER WAGON
Beautifully enamelled in green.
Price **2/-**



***No. 1 LUMBER WAGON**
Fitted with bolsters and stanchions for log transport.
Price **2/-**



***No. 2 LUMBER WAGON**
Fitted with bolsters and stanchions for log transport. Suitable for 2-ft. radius rails only.
Price **5/-**



PLATFORM ACCESSORIES
No. 1. Miniature Luggage.
Price per set **2/-**



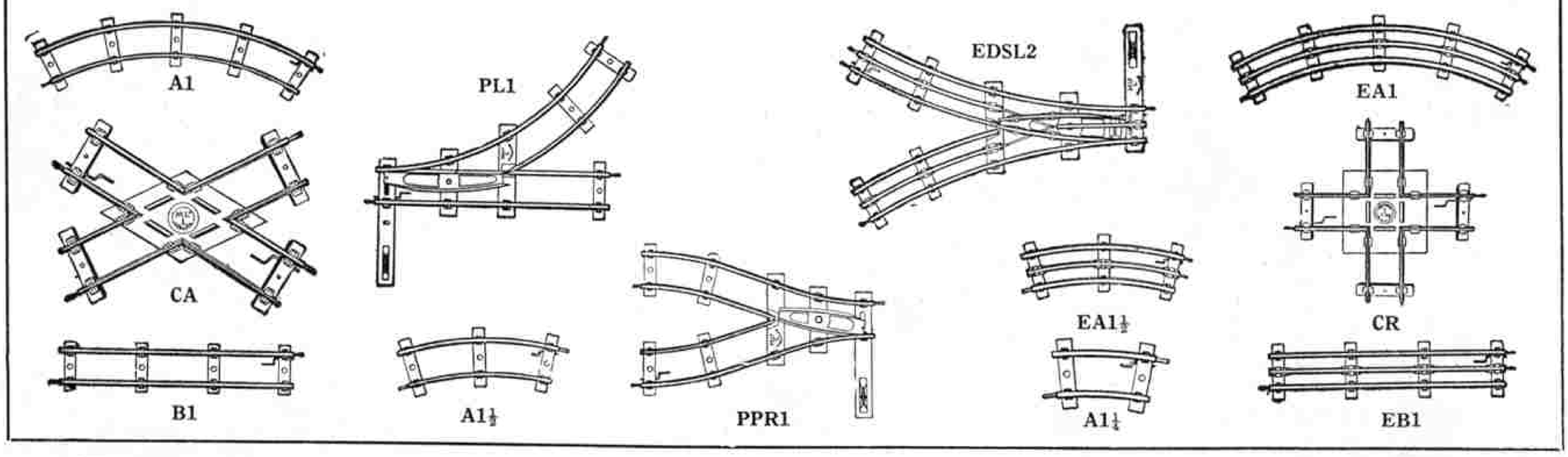
PLATFORM ACCESSORIES
No. 3. Platform Machines, etc.
Price per set **2/-**



PLATFORM ACCESSORIES
No. 2. Milk Cans and Truck.
Price per set **2/-**

**Lettered L.M.S. or L.N.E.R.*

RAILS, POINTS AND CROSSINGS

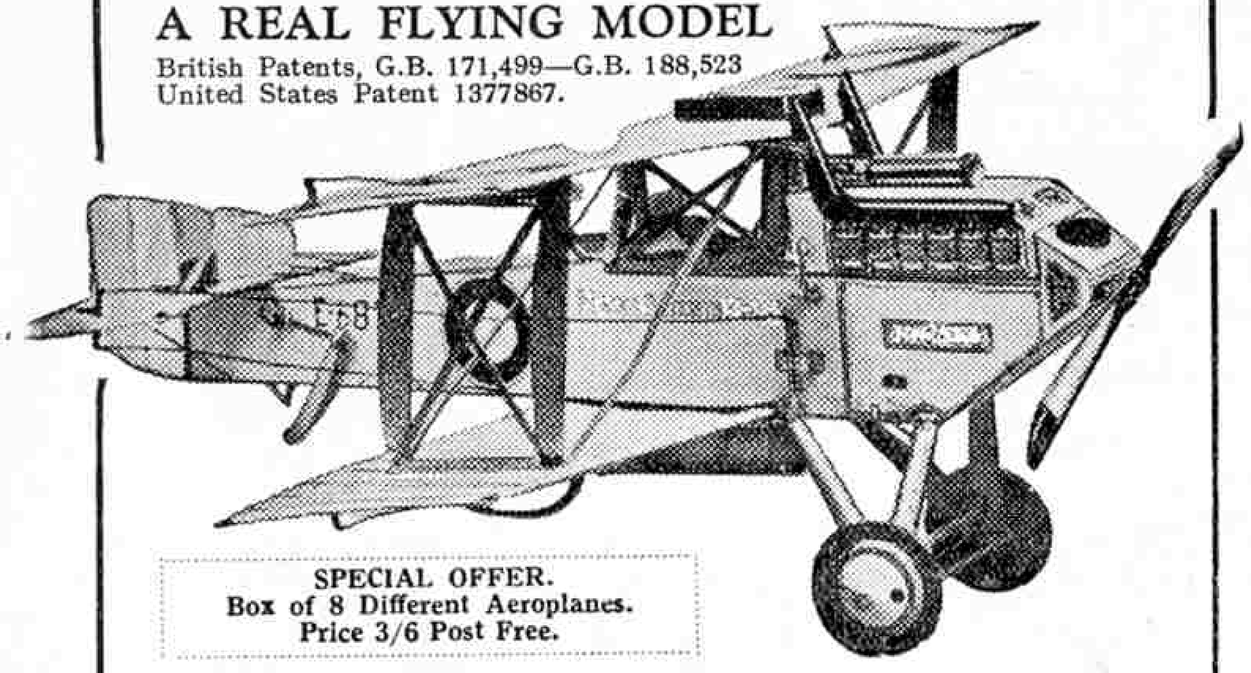


Hornby Rails, Points and Crossings are built for hard wear and for smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. Note the great superiority both in quality and appearance of the Hornby rails compared with other rails and note also the extra sleepers, giving added strength and steadiness to the track. All Hornby Rails, Points and Crossings are Gauge 0, 1¼", and the Electric rails are fitted with a third rail for collecting shoe.

ASK YOUR DEALER TO SHOW YOU SAMPLES

A REAL FLYING MODEL

British Patents, G.B. 171,499—G.B. 188,523
United States Patent 1377867.



SPECIAL OFFER.
Box of 8 Different Aeroplanes.
Price 3/6 Post Free.

Build This Fine Model Aeroplane

The very thing for the dark evenings. The model has all the parts and controls that you'll find on the big planes. Elevators, ailerons, machine-guns, pitot tubes, windscreens and even a miniature dashboard with dummy instruments, gauges, etc. Real elastic shock absorbers are fitted to the landing wheels and tail skid.

When you have built up the model you can make it do everything that a real plane can do.

Size of Model 12″, Span 13″ Long.

Complete Set of Cardboard Parts printed in colours, together with all necessary Elastic, Wood, Wire and Book of Instructions.

PRICE 1/- (Post 4d. extra)

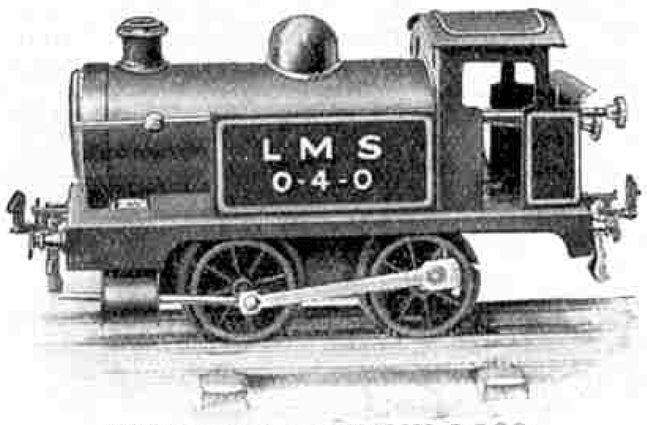
Our New 1926 Catalogue is now ready. Price 2d., post free.

Send P.O. off to-night to :

WILLIAM E. APPLEBY (N/C) & CO.

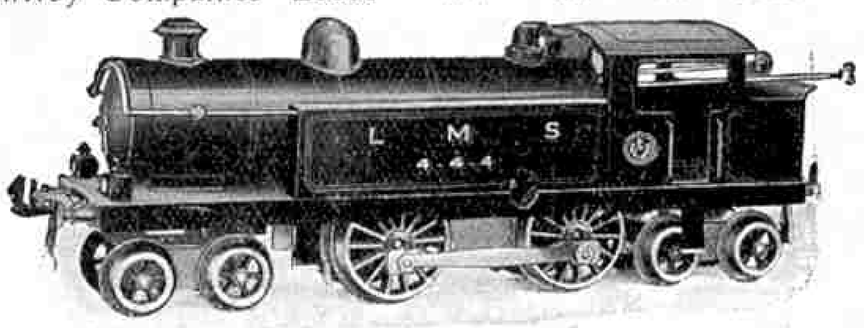
(Dept. K.), 217, Jesmond Road, Newcastle-on-Tyne.

HORNBY TANK LOCOS



HORNBY No. 1 TANK LOCO

Strong and durable loco capable of any amount of hard work; richly enamelled and highly finished; fitted with reversing gear, brake and governor.
Gauge 0, in colours to represent L.M.S., L.N.E. or G.W. Railway Companies' Locos ... ... Price **12/6**



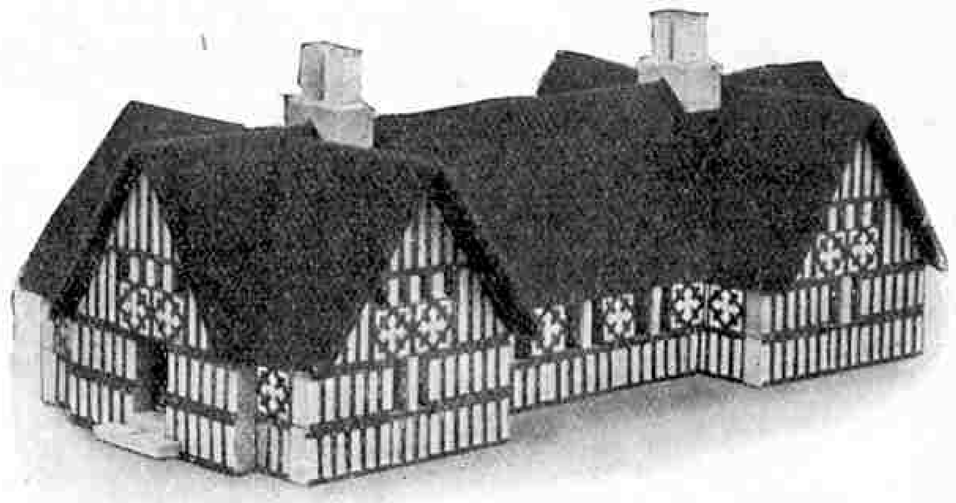
HORNBY No. 2 TANK LOCO

Powerful model embodying all the characteristics of the Hornby series. It is 11½″ in length and is fitted at both ends with a four-wheeled bogey. Beautifully finished in colours to represent L.M.S., L.N.E. or G.W. Railway Companies' Locos, and suitably lettered. Fitted with reversing gear, brake and governor. Suitable for 2 ft. radius rails only. Price ... **30/–**

FROM ALL MECCANO DEALERS

LOTT'S BRICKS

A CHARMING RANGE OF NEW MODELS IN THE TUDOR SERIES IS NOW READY



A Cheshire House, from Boxes 3 and 3a or Box 4

TUDOR BLOCKS

Box	1	12 Models	.. 3/6	Box	3a (Supplement)		25/–
,,	2	18 ,,	.. 7/6	,,	4	30 Models ..	42/–
,,	3	24 ,,	.. 21/–				

LOTT'S BRICKS

From 2/– (6 Models) to 42/–

Some Provincial Stockists:

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Write for Illustrated Lists and Address of Nearest Agent.

LOTT'S BRICKS LTD.

WATFORD

JAEGER
Pure Wool

The New "Meccano" Jersey

This Jaeger "Meccano" Jersey is made in the special "Meccano" pattern. It wears splendidly and prevents chill when a boy gets hot, as every boy will sooner or later. The "Meccano" Jersey appeals to every boy at once as well as to the "grown-ups" who study the health, happiness and appearance of children.

22″	24″	26″	28″	30″ Chest
7/–	7/9	8/6	9/3	10/–

Colours :—Navy body with Light and Dark Saxe dice effect.
Mid Grey body with Black and White ,,
Fawn body with Brown and Saxe ,,
Brown body with Fawn and Red ,,
Saxe body with Navy and Dark Saxe ,,
French Grey body with Lt. and Dk. Saxe ,,

Three-quarter Hose, Turnover Tops to match

3, 4	5, 6, 7	8, 9, 10
2/9	3/3	3/9

Obtainable only from Jaeger Depots and Agents.
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JAEGER HEAD RETAIL DEPOT : 352/54, OXFORD ST., LONDON, W.1.
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The New "Meccano" Jersey

THE MECCANO BOY KNOWS THE VALUE OF
SECCOTINE
(REGD. TRADE MARK)



WITH it he makes or mends things innumerable—Picture Frames, Models, Bats, Balls, Boats, Boxes, Bags, Books—Oh a hundred things. And then he can help his

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She will have Chairs, Tables, Beds, Slippers, Curtains—at least fifty things. And his

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Every day in life she will bring him something to be made or mended with his wonderful SECCOTINE.

THREE SIZES AT

4½d., 6d. and 9d. per tube.

WRITE FOR A FREE BOOKLET ABOUT WHAT SECCOTINE CAN DO

McCAW, STEVENSON & ORR LTD., THE LINENHALL WORKS, BELFAST

Meccano & Hornby Train Supplies

All the dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

MERCER'S DOLLS' HOSPITAL,
68, Darwen Street,
BLACKBURN.

BROWN, MUFF & CO. LTD.,
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W. CARTER,
15, Bridge Street,
opp. Mechanics' Institute, BRADFORD.

GYLES BROS. LTD.,
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SAM TAYLOR,
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A. M. HARRIS,
"Wilces Toy Shop,"
14, High Street Arcade, CARDIFF.

R. H. JEPSON,
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H. W. GILL,
23 & 24, Pittville Street,
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RATCLIFFES TOYERIES,
19, Osmaston Road,
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C. E. MELLER,
"Dolls' Hospital,"
DONCASTER.

JOHN ARCHIBALD,
20, Woolcomber Street,
DOVER.

DIXON'S,
41, High Street,
DUNDEE.

DRAFFEN & JARVIE LTD.,
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DUNDEE.

PURSEY & MOCKRIDGE,
The Sports Outfitters,
Tel. Dartford 173 DARTFORD.

CARTER'S STORES,
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Tel. 953 EASTBOURNE.

BASSETT-LOWKE LTD.,
1, Frederick Street,
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WRIGHT'S DOLLS' HOSPITAL,
14, High Street,
ERDINGTON.

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HARRY HUBBARD,
8, High Street,
(Opposite the Cricketers) GILLINGHAM.

ROBERT BALLANTINE,
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CLYDE MODEL DOCKYARD,
22-23, Argyll Arcade, GLASGOW.
Model Makers to the Admiralty, the Railway Coys., etc.

POLLOCK & CO., 36, Bridge St. and
222 and 245, Argyle Street
and 39, Paisley Rd. West, GLASGOW.

FLETCHER'S TOYLAND,
77, Deardengate, HASLINGDEN.
Grand Building, RAWTENSTALL.

HAMMOND'S LTD.,
Paragon Square,
HULL.

SMITH & DANIELS,
59, Westgate St., IPSWICH.
25, Market Place, GT. YARMOUTH

PEARSON & DENHAM (PHOTO)
LTD., 6, Bond Street,
LEEDS.

ROBOTHAM,
"Baby's Kingdom,"
Tel. 4809 LEICESTER.

LLOYD & SON,
2, Station Street,
LEWES.

BYCROFTS EMPORIUM,
366, High Street,
LINCOLN.

C. LUCAS, Hobbies Depot,
35, Manchester Street,
LIVERPOOL.

Reliance Cycle & Motor Co.,
29/31, Manchester St., Liverpool.
Argyle & Conway Sts., Birkenhead.

F. R. POTTER & SON,
43, Market Place,
LOUGHBOROUGH.

H. G. PARTRIDGE & CO.,
10, Chapel Street,
Tel. 234 LUTON.

BARR'S CHILDREN'S PARADISE,
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BAXENDALE & CO. LTD.,
Miller Street,
Tel. 5900 City (20 lines) MANCHESTER.

A. FRANKS LTD.,
95 & 97, Deansgate, MANCHESTER.
90, Bradshawgate, BOLTON.

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H. WILES LTD.,
124, Market Street,
MANCHESTER.

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MARGATE.

R. SCUPHAM & SONS,
35, Linthorpe Road.
MIDDLESBROUGH.

ALFREDS, TOY SHOP,
77, Northumberland Street,
NEWCASTLE-ON-TYNE.

WILLIAM OLLIFF,
13, Grainger Street West,
NEWCASTLE-UPON-TYNE.

Meccano & Hornby Train Supplies

The ten dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

THE OXFORD SPORTS DEPOT,
117, St. Aldates',
OXFORD.

A. J. ROBERTSON,
39-41, Broad Bridge Street,
Tel. 374 PETERBOROUGH.

DEAN & HOLT,
701, Yorkshire Street,
ROCHDALE.

A. J. TINKER,
20, London Road,
SHEFFIELD.

WILSON, GUMPERT & CO. LTD.,
57, Fargate,
Tel. 489 SHEFFIELD.

BIRMINGHAM & COVENTRY CYCLE CO., 140 & 151, Above Bar, SOUTHAMPTON.

OSBORN & CO.,
9, High Street,
SOUTHAMPTON.

S. T. SIMPSON & SON,
589-595, Lord Street,
Tel. 999 SOUTHPORT.

TAYLOR BROS.,
Great Underbank,
Tel. 630 STOCKPORT.

SPORTS HOUSE — **WOKING & WEYBRIDGE.**

Boys!—

build a working model railway, realistic in appearance and efficient in operation, by using

HORNBY TRAINS

AND ACCESSORIES

Model Railway enthusiasts will find their every want satisfied at the

Arundel Cycle & Sports Stores

"The Hornby Train Shop"
52, Church Road, Upper Norwood, S.E.19

MODEL RAILWAY CLUB

EXHIBITION

of Members' Work

KINGSWAY HALL
KINGSWAY, W.C.1.

Thursday, April 15th— 2 p.m. to 10 p.m.
Friday, April 16th—10 a.m. to 10 p.m.
Saturday, April 17th—10 a.m. to 10 p.m.

Admission:
Adults 1/2 (Including Tax) Children 6d. (under 12)

"MECCANO MAGAZINE" BINDER
Your Magazines may be kept clean and tidy by enclosing them in the special binder we supply. Price 3/- post free, from Meccano Ltd., Binns Road, Liverpool.

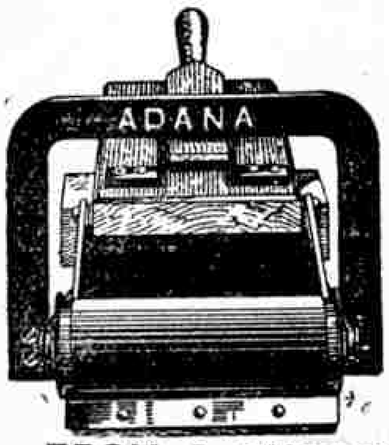
How to obtain the "*M.M.*"

The "*M.M.*" may be ordered from all Meccano dealers, or from any newsagent or bookstall. Price 3d. per copy. Direct subscriptions to this office will be at the rate of 2/- for six, or 4/- for twelve issues. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

Meccano Magazine, Binns Road, Liverpool

ADANA AUTOMATIC SELF-INKING

PRINTING MACHINE



45/-

COMPLETE PLANT

This massively constructed Printing Machine is the most wonderful of its kind, being sold at a tenth the price of any other of the same size with similar advantages. It is capable of turning out every class of printed matter

FROM A CHEMIST'S LABEL TO AN ILLUSTRATED MAGAZINE

including Perforating, Creasing and Box-making. The finest malleable iron and mild steel used in construction. Smooth running, speed, accuracy and simplicity are maintained to the highest efficiency. Printers' metal type (not Mono), case, complete accessories, together with excellently illustrated instructional book, included in above-quoted price. Illustrated particulars in two colours, together with samples of work, sent on receipt of stamped addressed envelope. Also sold by small weekly instalments. Ask for Terms.

THE "ADANA" AGENCY (Dept. M.M. 4),
34, King Street, Twickenham, Middlesex.

Printers should write for particulars of new system of supplying First-Class Founders' Type.

HANDS UP!



Real Revolvers firing blank cartridges. **No Licence Required.** Accidents impossible. Ideal for theatricals, races, sports, etc. Single shot, small **2/6**
Large 4/6 post free.
6-Chamber, blued steel or nickel, 7/6 post free.
8-Chamber, " " " 10/6 " "
10-Chamber, extra large, heavy pattern, 15/- post free.
These are handsome guns, beautifully made and perfect in every detail. **Cartridges 1/6 per 100.** Carriage 9d. any quantity.

1/6 THE BULLY BOY 1/6

20 SHOT REPEATER.
Fires a pea 25 feet. Bright nickel finish, each in box with ammunition.



A better shooter than you have ever had before. Foreign and Colonial postage on all guns 9d. extra.

Send for 1926 *Catalogue.*
J. BISHOP & CO.,
41, Finsbury Square, LONDON, E.C.

GET IT NOW!
The Compendium of Applied Electricity
A comprehensive little book on electricity giving all details of electricity in nature in experiments and in its practical use. Full of illustrations and with dictionary of electrical terms at the end. **2/2** Post Free.
A Book Every Boy Should Have.
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ROLLER SKATES



Provide **healthy, ideal** and **safe** exercise for **boys** and **girls.**
They have become almost as much a necessity as a **Meccano** or a **Hornby Train.**
Our **Sales** are **ncreasing** every day and **our prices, THE LOWEST IN THE TRADE, will remain the same** whilst our present stock lasts.

No. 3 with Threaded Clamps and Case-hardened Steel Wheels are only 5/- pair
No. 5 with best Ball-bearing Wheels 10/- "
No. 6 " " " and Block Heels, as illustrated" 11/- "
Postage and Packing 1/- per pair extra.

Send at once to
Bateson's Sports Depôt, Blackpool



Play Billiards in your Home on a RILEY BILLIARD TABLE

A P.O. for 14/- will bring a Home Billiard Table to your door. The balance you pay monthly. Cash prices from £7. "Combine" Billiard and Dining Tables from £22 10s. or in monthly payments. Carriage Paid. Free packing case. **7 days' approval.**

Send for PRICE LIST

E. J. RILEY LTD., Deal Works, ACCRINGTON.



2 FREE GIFTS!
Purse and Pocket Knife Given Away to All who buy a Pen!

The 'SILKRITE' Registered SELF-FILLING FOUNTAIN PEN. Over 5000 Testimonials received! **'Guaranteed 5 Years' Wear!** **1/6**



G. FRANCIS, Esq., writes: "25 Pens have I purchased, and all my friends are perfectly satisfied." M. G. POWELL, Esq., writes: "Delighted with 'Silkrite' Pen. It equals any other make at 10/-." **2 FREE GIFTS: With every Pen at 1/6 each** and 3d. extra for postage of gifts **we GIVE FREE a Real Leather Lock Purse and a Handsome Pocket Knife** (2 blades) as sketch. 1926 *Gift Catalogue, Richly Illus., full of Big Bargains, Post Free!* **THE LEEDS BARGAIN CO. (M.M.), 31, KENDAL LANE, LEEDS**

GUARANTEED TO SAIL!

12/9d.
(Post Free)



"REGATTA" RACING YACHT

SPECIFICATION. Four white sewn sails, fitted with rings giving adjustable tension. Hull painted and varnished in colours. Mast removable. Lead keel. Length of hull :—18".
Specially designed for

PANTOYS LIMITED
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TERMS TO TRADE ON APPLICATION

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Fretwork Sale

March 15th to April 12th.

25% Discount off Catalogue Prices

3d. in every 1/-

TIMBER, TOOLS, DESIGNS
SAWS and FRET. MACHINES
Sale List Free.
Everything in Stock.

C. LUCAS,
HOBBIES' DEPOT,
35, Manchester Street
LIVERPOOL.



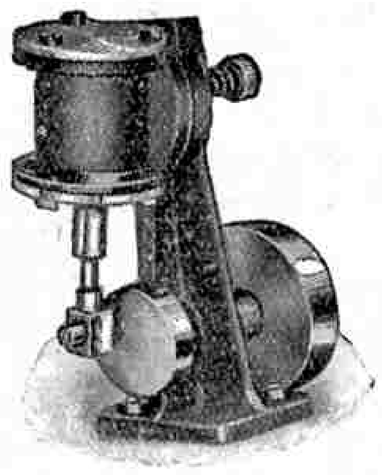
JENNERS
PRINCES STREET EDINBURGH
LIMITED

EDINBURGH AGENTS for MECCANO and Hornby Trains

JENNERS PAY CARRIAGE

NEW CYCLES FOR EASTER!

Famous "Legion" Cycles. Boys' or Gent.'s Models ... from £4 17 6
" " Girls' or Ladies' " ... " 5 5 0
Rudge-Whitworth, from £5 10 0 Genuine B.S.A. ... " 6 12 6
Sole **Ealing** Agent for **"Famous James,"** ... Prices " 6 0 0
Deferred Payments arranged.
Unlimited time guarantee with every machine.
Send for free Catalogues and full particulars.
KAIN'S "Guarantee" SERVICE (Cycle Makers since 1898), THE GROVE, EALING, LONDON, W.5.



"I am very pleased with the plant which drives a Meccano model at terrific speed although I have used 3 sets of reduction gear. The S.T. plant must be the most powerful engine on the market for its size."
Thus writes a customer. The engine shown above can be built with a screwdriver and we give full instructions. We *guarantee* the engine to work well.

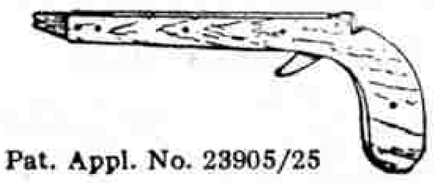
S.T. Engine Parts ... 5/- } *Post*
Finished Boiler 8/- } *Free*

Send stamp for list 12M or 6d. for complete "Engine" catalogue (80 pages).

Stuart Turner Ltd.
HENLEY-ON-THAMES

HOW SHALL I SPEND THAT HALF-CROWN?

"THE PELTIC PISTOL"



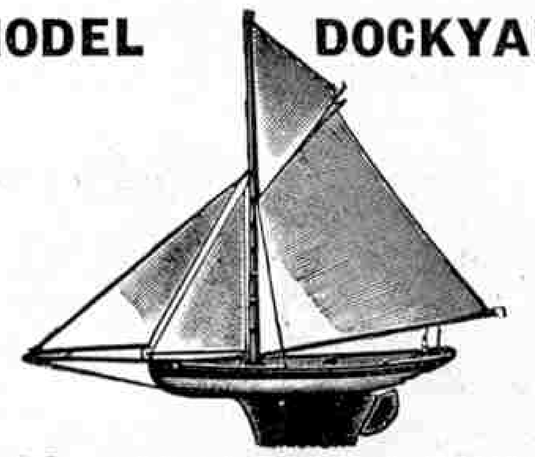
Pat. Appl. No. 23905/25
is the very thing if you want some good sport.

You can learn to shoot quite accurately but quite harmlessly.

You can shoot the loop at a match box across the room and hit it. You can shoot at a mark on the window but not break the glass.

PRICE 2/6 POST FREE.
Including Peltic Target and 6 Loops.
RADIOR CO. LTD.,
OLD QUEBEC ST., LONDON, W.1.

KENSINGTON MODEL DOCKYARD



Sailing Yachts and Fittings

HORNBY TRAINS
MECCANO OUTFITS & PARTS
Always in Stock.
WORMAR STEAM ENGINES for driving MECCANO AND OTHER MODELS
Requisites for OUTDOOR and INDOOR SPORTS PHOTOGRAPHY, FRETWORK, &c.

Send 1½d. Stamp for List "M."

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Tell Mother Gale's repair **Sewing Machines.** It does not matter what make of sewing machine it is, or how old. **Correct Needles,** Shuttles, Bobbins, Belts, Oil, Parts, etc., for any machine sent on request by postcard or letter to **Gale's, Replingham Rd., Southfields, London, S.W.18.**

MAKE YOUR OWN ELECTRIC LIGHT

These wonderful Dynamos light brilliantly 4-6v. lamps, and are very easy to work. **5/6,** post 6d. Will also work as Electric Motors.

5/6



GREENS (Dept. E.N.),
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Post Free 7½d. **THE NEW GAME "GALE BILLIARDS"** Post Free 7½d.
(Registered Copyright).
Gale's, Replingham Rd., Southfields, London, S.W.18

BRITISH MADE — GUARANTEED

THE STEAM ERA FOR MECCANO

Just as Stevenson's Steam Engine brought about a new era in engineering, so has the Wormar Steam Engine for Meccano revolutionized the methods of Meccano workers throughout the whole world. We have received large numbers of unsolicited letters testifying to the tremendous additional pleasure and instruction Meccano workers of all lands have derived from the use of this engine with their Meccano sets. Realism has always been the goal of model workers and the Wormar Engine not only enables you to drive your models exactly like the real machines you are imitating, but when you see the clouds of steam, and hear the roar of the high speed engine coming from your Meccano Steam Crane, etc., you feel you are really making engineering models and not just clockwork toys.

Being drilled with standard Meccano drilling (by kind permission of Messrs. Meccano Ltd.), the engine can be transferred from one Meccano model to another by removing 4 screws.

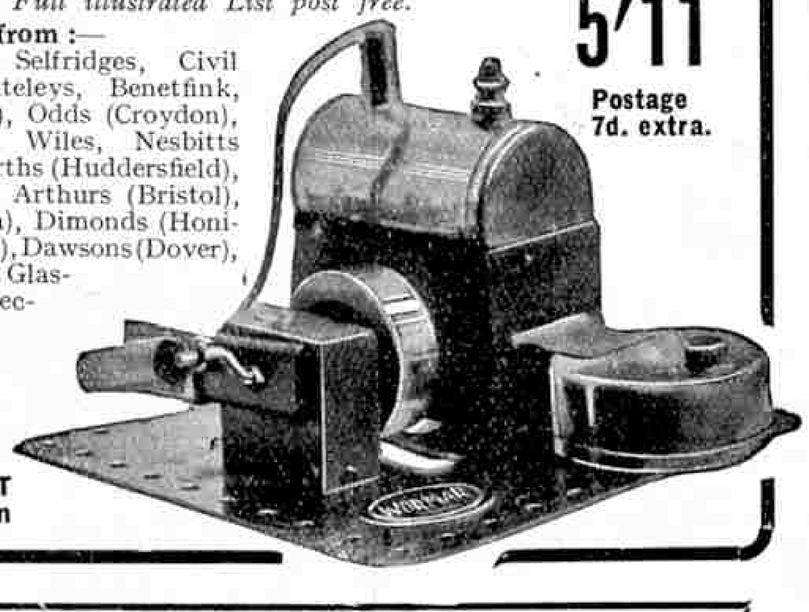
THE WORMAR ENGINE FOR MECCANO

gives colossal power and tremendous speed, and being sturdy British make is totally different from the cheap foreign engines.

Full illustrated List post free.

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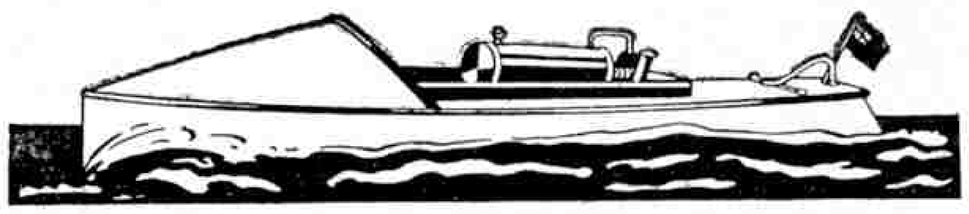
Postage 7d. extra.



Obtainable from :—
Gamages, Hamleys, Selfridges, Civil Service Stores, Whiteleys, Benetfink, Lorbergs (Kensington), Odds (Croydon), Bentalls (Kingston), Wiles, Nesbitts (Manchester), Rushworths (Huddersfield), Beale (Bournemouth), Arthurs (Bristol), Sports Co. (Tamworth), Dimonds (Honiton), Meller (Doncaster), Dawsons (Dover), Macrae (Hellensburgh, Glasgow), and all large Meccano stockists.

If any difficulty in obtaining, send P.O. 6/6 direct to (mention dealer)

WORBOYS & SMART
156, King Street, Luton



"DIXIE" MOTOR BOAT

A beautiful little model 21 inches long. Made with either Clockwork or Steam Drive. Spray-hood and hull hand painted; decking hand polished. Price **21**/– *carriage paid.*

Model Ships, Power Boats and Fittings

Our Catalogue of Model Ships and Power Boats

will be sent post free upon receipt of **6d.**; mention **Section S/17** when applying for this list.

It is not an ordinary catalogue of prices, but a real magazine of information regarding **Power Boats, Ships, Fittings,** etc. There are over 80 pp. of wonderful photographs and illustrations, together with full particulars of

REDUCED PRICES for FITTINGS,

and it will repay every sailing and power-boat enthusiast to get this latest edition.

NEW MODELS

include HIGH-CLASS EXHIBITION WORKING MODELS of **Steam Yacht, Cargo Boat, Cross-Channel Packet, Lifeboat, Tugboat, Model "P" Boat** and **Exploration Ship**—all of the best workmanship—at prices ranging from **Five Guineas.**

The Bassett-Lowke Standard of Quality is maintained.

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Edinburgh Branch – – – 1, Frederick Street



Kiddies enjoy this All-British Toy

They skip as they scoot and the easy up and down motion of their body is all that is necessary to send the Skip-Skoot flying along. Skipping is good for health. Skip-Skooting combines them both and adds a joyous thrill. Easy to master and most fascinating. Both feet kept on footboard, so does not wear out boots. Notice the adjustable support. A kick puts it into position and you leave the Skip-Skoot standing upright. Price 19/6.

TAN-SAD WHEEL TOYS

TAN-SAD LTD., Drake Works, Albert St., BIRMINGHAM.
London : 9, Phœnix Place, Mount Pleasant, W.C. 1.



Chock full of Bounce — and British too!

YOU can't knock the bounce out of a genuine Sorbo—it outbounces and outlives all the stodgy foreign imitations.

Sorbo was the original British unburstable ball—it is still unbeaten. Don't waste money on flabby substitutes, *insist* on a genuine Sorbo.

Sorbo Bouncer

THE BALL YOU CAN'T BURST

Of all dealers. Prices 2½d. to 1/6 each.
In assorted colours.

SORBO RUBBER-SPONGE PRODUCTS, LTD.
Sorbo Works, Woking.



Readers' Sales and Wants



If you have anything to sell or wish to buy anything take advantage of the service offered by a small advertisement in these columns.

The "*M.M.*" is read by approximately 100,000 people every month. It circulates in every country where the English language is spoken. If you wish to sell your duplicate stamps, your rabbits, or your tools, or to purchase a loud speaker, a steam engine, a model yacht, or a hundred-and-one other things, you will be able to do so through the columns of the "*M.M.*"

The rates are one penny per word, with a minimum of 1/- (cash with order).

Your advertisement must be received before the 10th of the month for insertion in the following month's issue.

If a Box Number is used, 4d. should be added to cover the cost of postage of the letters to the advertiser from this office. The letters will be posted one week after the advertisement appears, and a second batch a month after the advertisement appears. They will be sent more frequently if additional postage is included with the advertisement.

IMPORTANT.—Advertisements dealing with any article in the Meccano Catalogue cannot be accepted.

READERS' SALES

(*Rate: 1d. per word, min.* 1/-).

For Sale. 100 Small and 50 Large Cigarette Cards at 6d. per dozen.—Morrissey, Kilcoran House, Cahir, Tipperary.

Boy's Magazines, Nos. 1 to 32, 2/6. Mechanical Boy, Bound, New, 6/6.—King, 49, Motcombe, Dorset.

Cinema Films—Topical Budget—Drama, together 1225 feet, 6/6, 1st Miniature Table Railway Set, 7/6.—Powell, St. John's Vicarage, Worcester.

Wanted, Gilbert's Sunshine Recorder and Rain Gauge, with instructions.—Kellett, 3, Exeter Street, Saltburn, Yorks.

Sale. 10 copies Magnet, 24 Hobbies, 30 excellent Fretwork Designs, 14 sets Cigarette Cards in Albums, 380 loose. Cheap.—Evans, Bryn Fawnog, Maenan, Llanrwst.

Steam Engine, Horizontal, 21/-, take 10/-. Sterling Baby Speaker, 57/6, take 30/-. Both perfect.—Mackenzie, Glesfinlas, Corstorphine, Edinburgh.

For Sale. Diana Air Pistol, very accurate. Shoots slugs and darts. Nearly new. Price 10/6 (cost 15/6). 4-5 volt Electric Motor, never used, 5/-.—Jerram, 63, Boundary Road, East Ham.

For Sale. Crystal Set, 7/6. Wireless Parts, 5XX Coil, etc. List.—Box 401.

Cigarette Cards. Set 50, 1/-, 25, 6d.—D. Gerken, Northview South, Myms, Barnet.

Horizontal Steam Engine, excellent condition, 14/6 or highest offer, reversing.—J. Meredith, Campbell Avenue, Runcorn, Cheshire.

Sale. Babcock Boiler, No. 500, and Stuart-Turner Mill Engine, Type S.50, £3. Worth more. Cinematograph, 15/-.—42, High Street, Herne Bay, Kent.

For Sale. Cigarette Picture Sets. Lists.—Doupe, Westcliffe, Tramore, Co. Waterford, Ireland.

"Miss America" Launch, used twice, splendid condition, what offers?—Murray, Cravenbank, Leigh Road, Southampton.

Vertical Stationary Steam Engine, hardly used, 15/-, worth double.—Asher, Loughboro' Road, West Bridgford, Nottingham.

Stamps. Collector's Duplicates, 6d. packets, postage 1½d.—Miller, 103, Rock Street, Sheffield.

Victory Album with over 1,000 different select stamps, including splendid high values, 10/-. Similar Album, 500 different, 5/9.—Meadows, 9, Scotstoun Street, Scotstoun, Glasgow.

What offers, 1,800 clean Cigarette Cards.—R. Smith, 293, London Road, Dover.

Lott's Stone Bricks, splendid for model railways. In strong wooden box, complete with roofs. Cost 22/6. What offers.—Swallow, Dryden House, Oundle, Northamptonshire.

2 Brownie (Box) for sale with case. 1st class condition. What offers?—R. Bristow, Sutton-at-Hone, Kent.

Books, Toys, Fretwork Tools, etc. Send Penny Stamp for List.—Box 402.

Miniature Table Railways. Sizes 8 and 10, 25/- and 12/6, also extras. Take 25/- lot. Excellent condition. Bargain.—Sadler, The Larches, Four Oaks, Warwickshire.

No. 4 Midg. ¼ plate Camera, speeded shutter, tripod, frames, masks, squeege, material, practically new, genuine bargain, 25/-.—Riddington, Field Terrace Road, Newmarket.

15/- Powerful 4 Cylinder Engine (Steam or Air), without boiler. Also Magic Lantern, Slides, Generator, etc. No further use.—Rutter, Crudgington, Wellington, Salop.

350 Cigarette Cards, 2 Albums, Gyroscopic Top, 25 Stamps, Steam Engine, 12/6.—Sidley, Mendip Lodge, Clevedon. Send card.

Railway Magazines, Pitmans' Commercial Self Educator, Pitman's Commercial Encyclopædia, Sale or Exchange Wireless.—Gardner, Upper Bridge St., Stirling.

Cigarette Cards, sold and exchanged. Lists.—Thornton, 159, Grosvenor Road, Wavertree, Liverpool.

2-4 Volt Electric Motor, 7/-. Also small Steam Engine, 3/-.—Brignall 16G.—Lewis, Flats, Ixworth Place, Chelsea, S.W.3.

Cigarette Cards, 9d. 100, sets 50, 1/-; 25,6d. Hulton's Annual, 1925, 3/-, new.—Alfred Yates, 16, Bright Street, Hulme, Manchester.

Model Railway, Steel and Tinplate Track, Electric Loco, Pullman Cars, Wagons and Accessories. Apply—J. W. Dickinson, 3, Ormskirk Road, Aintree.

Miniature Table Railway, 13 Points, 9 doz. Lines, 1 Loco, 6 Carriages, Stations, etc. What offers?—Taylor, "The Ash," Marple.

Meccano Magazines, July-December, 1923, January-December, 1924, January-August, 1925. 4/6.—Box 463.

Don't miss this bargain. Dispersing collection. 108 Stamps, perfect, none issued after 1905, catalogue value £2/1/6, for 4/9.—Ayres, 5, South Ridgway Place, Wimbledon.

SMALL ADVERTISEMENTS

(*Rate* 1/- *per line*).

Stammering. Stammerers or Parents should write for my 36-page booklet, post free.—Lee Wareing, Dale Avenue, Bispham, Blackpool.

Fertile Ova and Living Larvae of Butterflies and Moths. Lists free.—Heath, 51, Woodville Road, King's Heath, Birmingham.

TABLE FOOTBALL GAME "Soccer," Real Goal and Nets. Wonderful Value. 1/6, Post Free.—Stokes, Millbrook House, Luton.

CINEMATOGRAPH FILMS, cheap British-made Machines and Cinema Accessories.—Filmeries, 57, Lancaster Road, Leytonstone, London.

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CINEMATOGRAPHS, Films, Accessories. Bargain second hand parts, Stamp lists, Baby Cine and Films cheap.—J. Humphreys, 40, Davenant Rd., London, N.19

Cinema Films for Sale or Hire, 6d. per 100 ft. Write, K. Skelhorn, Greystones, Gaskell Rd., Altrincham, Ches.

Cinema Films for Sale, Cheap, Write for Lists.—W. Wiseman, Viewpark Drive, Burnside, Glasgow.

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THE "KENT" MODEL. A gentleman's full-size Pocket Watch. Every part interchangeable and fully guaranteed. Keyless Winding. Strong Nickel Silver Dustproof Cases, 5 years' warranty. White Dial with Seconds Indicator. Timed to 30 seconds a month. Send P.O. and have one on 7 days' trial. Satisfaction or money back. Post Free.

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CUT THIS OUT. '**Meccano**' **Pen Coupon, Value 3d.**

Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14-ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.) Satisfaction guaranteed. Your own name gilt letters, either pen 1/- extra. Lever Self-Filling Model with Safety Cap, 2/- extra.



MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICES:
BINNS ROAD LIVERPOOL.

Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 3d. per copy. It will be mailed direct from this office, 2/- for six issues and 4/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest; payment will be made for those published.

Binding Cases. Spring-back Binders to take a number of "*M.M.'s*" are supplied, covered with imitation leather and lettered in gold, price 3/- each (post free).

Meccano Writing Pads. Fifty sheets of tinted bank paper, each printed with Meccano boy at head, 1/- (post free) large size, and 6d. (post free) smaller size.

Advertisements

Readers' Sales and Wants. Private advertisements *i.e.*(not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/- per line (average seven words to the line), or 10/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest circulation figures, will be sent on request.

Press Day, etc. Copy must be received not later than 10th of each month for publication in following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher Copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 4d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Meccano* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 3d. per copy, or mailed (post free) direct from Liverpool, 2/- for six issues, or 4/- for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms.

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Messrs. Browning, Ifwersen Ltd., P.O. Box 129, Auckland.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

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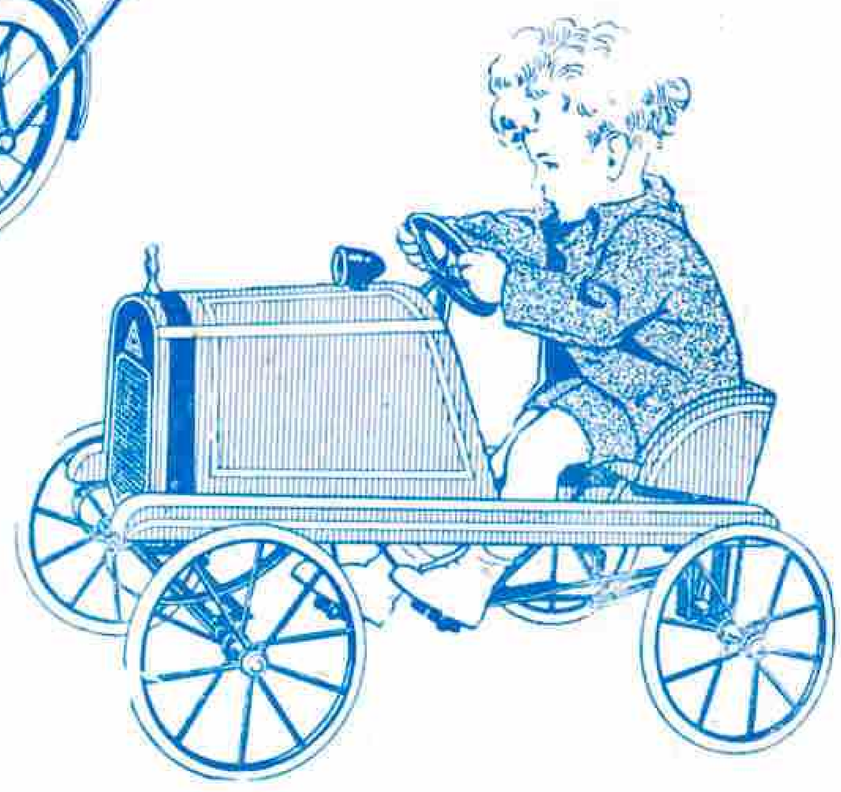




The new "Fairycycle" Association now being formed is in the interest of children, and membership will be free on application to all those purchasing a Fairycycle.

FREE. *A Folder in colours describing these Toys gladly sent on application to Dept. M.M.*





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Here is the very thing for the tiny chap. It is painted a gay, bright red, with nickel-plated handlebar and stem, rubber pedals, etc.

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April . . . . Evenings are drawing out and brighter weather is on the way. Gamages are ready with Cameras, Bicycles, Air Guns, Camping needs, etc., to see that Meccano Boys miss none of the Joys of an open-air Summer. If you cannot call at Holborn, write (mentioning "Meccano Mag.") and tell us about your Hobbies, and we will send you a Catalogue about them—quite free!



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30 ins. long. Will run for 20 minutes and will travel a mile on the water. Complete with 2-wick Lamp, Filling Funnel and detailed instructions. Post 9d. Price **12/6**

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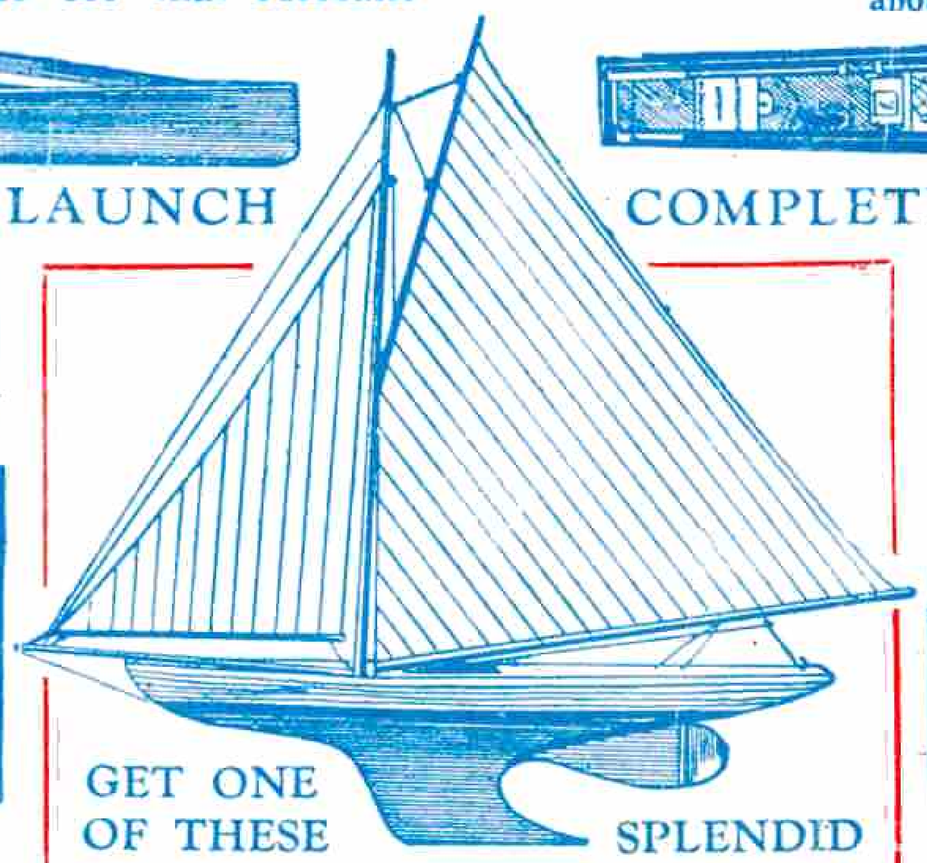
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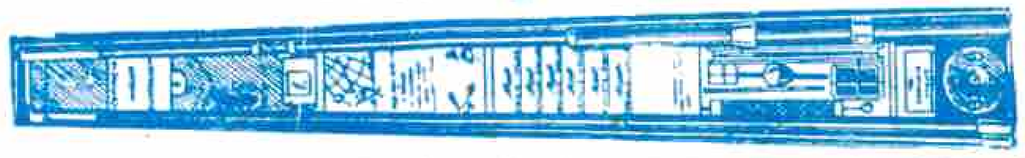


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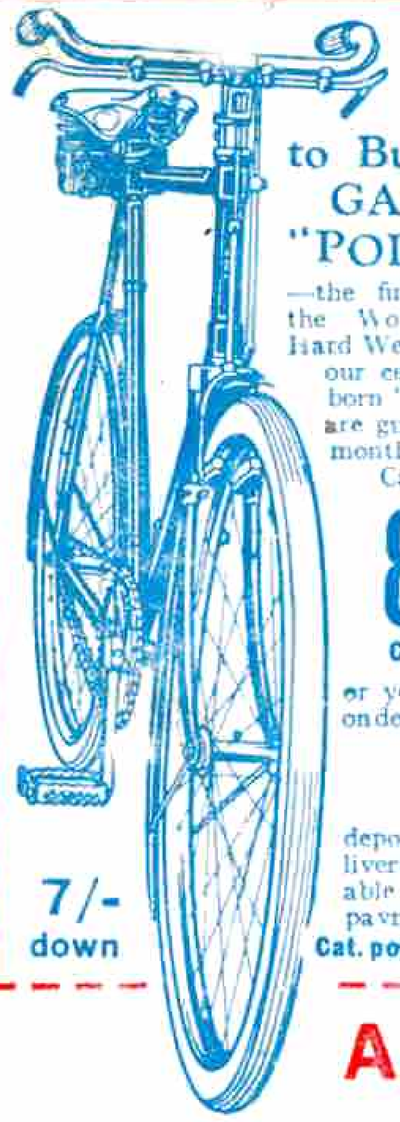


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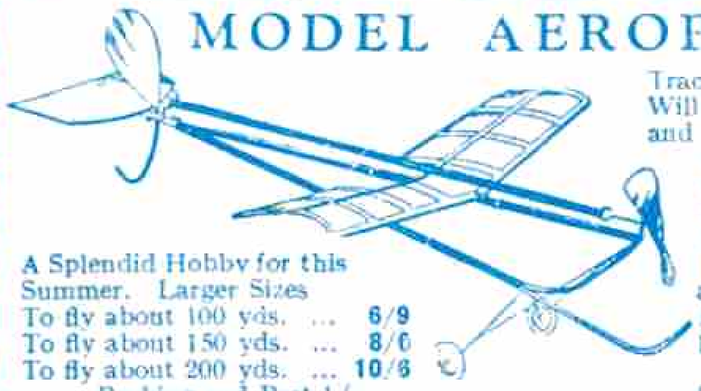
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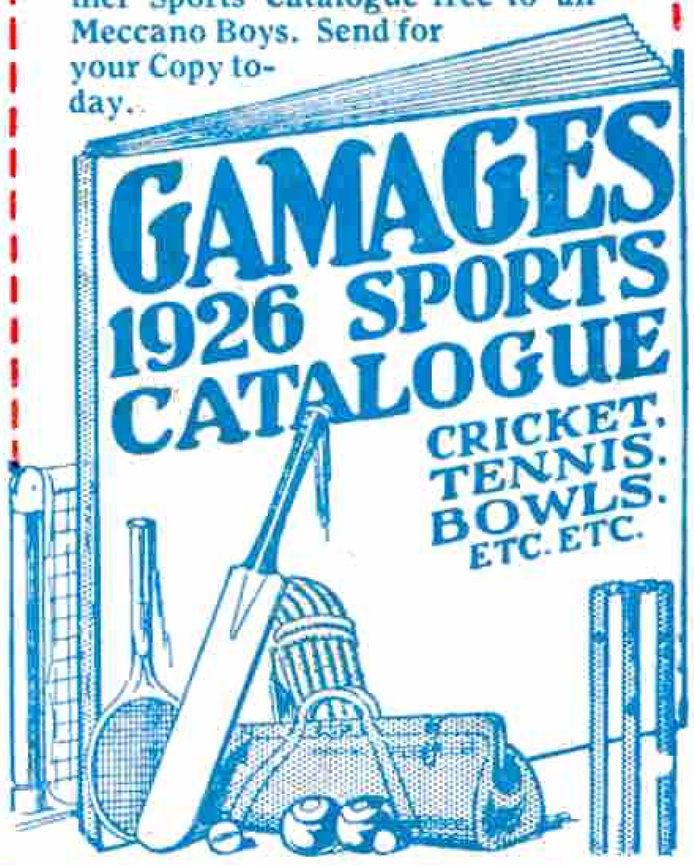
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